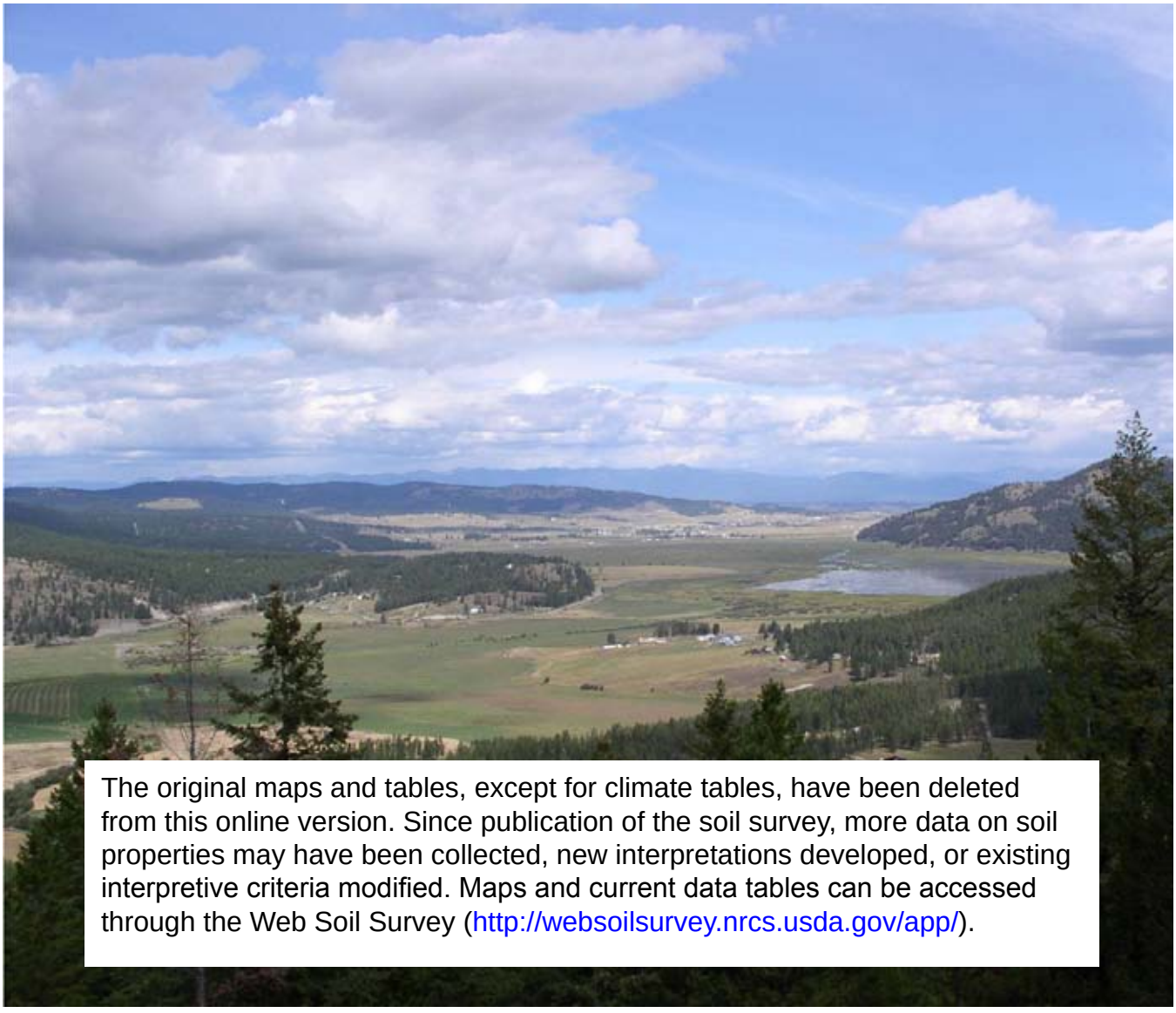
United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with the Montana Agricultural Experiment Station

# Soil Survey of Flathead County Area and Part of Lincoln County, Montana



The original maps and tables, except for climate tables, have been deleted from this online version. Since publication of the soil survey, more data on soil properties may have been collected, new interpretations developed, or existing interpretive criteria modified. Maps and current data tables can be accessed through the Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/).

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# How to Use This Soil Survey

The detailed soil maps can be useful in planning the use and management of small areas. You can access the detailed soil maps at the Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/).

Go to the web site and follow the instructions to access the maps. Once the area of interest (AOI) has been selected, the “Soil Map” tab will provide a view of the detailed soil map and a legend that is hyperlinked to map unit descriptions. Click on the “Soil Data Explorer” tab to access the interpretations and reports. Report categories and subcategories include Suitabilities and Limitations for Use, Soil Properties and Qualities, and Soil Reports. Intrepretive data can also be accessed at the Soil Data Mart (http://soildatamart.nrcs.usda.gov/).

See the Contents for sections of this publication that may address your specific needs.

## National Cooperative Soil Survey

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. This survey was made cooperatively by the Natural Resources Conservation Service and the Montana Agricultural Experiment Station. The survey is part of the technical assistance furnished to the Flathead County and Lincoln County Conservation Districts.

Major fieldwork for this soil survey was completed in 2005. Soil names and descriptions were approved in 2008. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2005. The most current official data are available at http://websoilsurvey.nrcs.usda.gov/app/.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

## Nondiscrimination Statement

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## Citation

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## Cover Caption

Photo of the Ashley Creek drainage, with Smith Lake and the town of Kila in the middle of the picture. Forested soils in the foreground and middle ground areas are Foyslake, McMannamy, and Kingspoint. Wimper, Castner, and areas of Rock outcrop are on the open slopes in the middle ground. Soils in the middle ground valley bottom are Barzee and Meadowpeak.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http:www.nrcs.usda.gov.

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Issued September 2010

# Alphabetical Index to Map Units

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# Foreword

Soil surveys contain information that affects land use planning in survey areas. They include predictions of soil behavior for selected land uses. The surveys highlight soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

Soil surveys are designed for many different users. Farmers, ranchers, foresters, and agronomists can use the surveys to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use the surveys to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the surveys to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. The location of each map unit is shown on the detailed soil maps. Each soil in the survey area is described, and information on specific uses is given. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Joyce Swartzendruber
State Conservationist
Natural Resources Conservation Service

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# Soil Survey of Flathead County Area and Part of Lincoln County, Montana

By Calvin Sibley, Project Leader

Fieldwork by Jonathan Gottschalk, Tia Leschin, Calvin Sibley, and Gregory Snell, Natural Resources Conservation Service

Editor, Mary E. Martinec, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with the
Montana Agricultural Experiment Station

Flathead County Area and Part of Lincoln County (fig. 1) is located in northwestern Montana. Flathead County encompasses 3,262,720 acres or 5,098 square miles. The survey area includes 283,700 acres, or about 443 square miles. The western part of Glacier National Park, along with parts of the Flathead, Kootenai, and Lolo National Forests, is located in Flathead County but not included in this soil survey. Flathead County is bordered by British Columbia, Canada, on the north; Lincoln County on the west; Sanders County on the southwest; Lake County on the south; Missoula, Powell, and Lewis and Clark Counties on the southeast; and Teton, Pondera, and Glacier Counties on the east.

Kalispell, the county seat, is the largest incorporated city in Flathead County. The two other major communities are Whitefish and Columbia Falls. According to the U.S. Department of Commerce, Bureau of the Census, the countywide population increased from 59,218 in 1990 to 74,471 in 2000. This represents a 25.8 percent increase in 10 years. From January 1, 2001, to July 1, 2009, the estimated population is 89,624, an increase of another 20 percent.

## General Nature of the Survey Area

This section describes some of the environmental and cultural features that affect the use and management of soils in the survey area. These features are History and Development, Geology, and Climate.

### History and Development

Calvin Sibley, Project Leader, Natural Resources Conservation Service, prepared this section.

The native people of this area were the Bitterroot Salish, Pend d'Oreille, and Kootenai tribes. The territories of these three tribes covered all of western Montana and extended into parts of Idaho; Wyoming; and British Columbia, Canada. Their history dates back at least 5,000 years. The Kootenai tribe often traveled through this soil survey area going from the Little Bitterroot River and Flathead Lake to the Upper Fisher River and the Kootenai River Valley. When outside pressures and settlement of

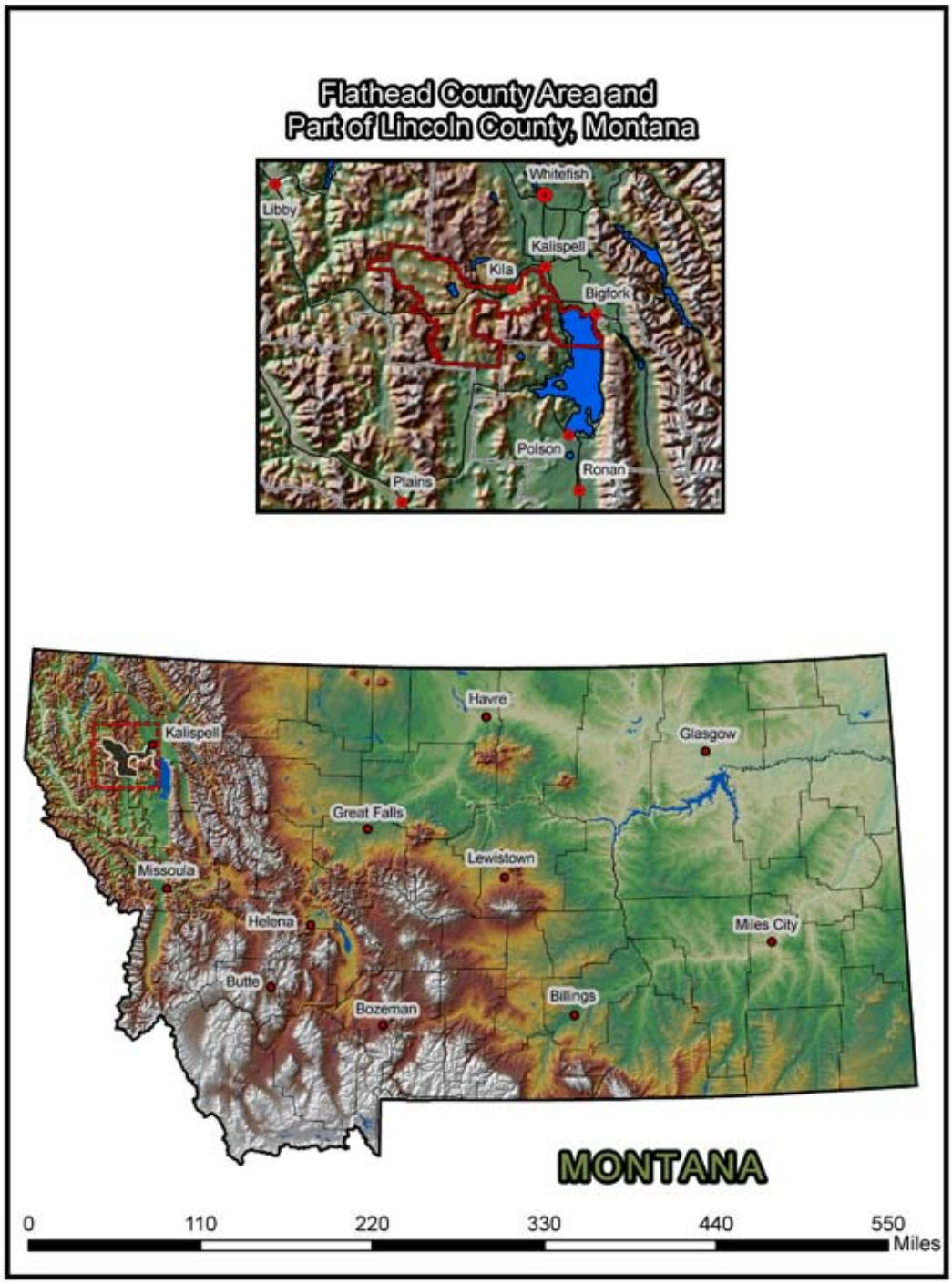


**Figure 1--Location of Flathead County Area and Part of Lincoln County**

the west by non-Indians became too great, tribal leaders negotiated the 1855 Treaty of Hellgate. This treaty established the Flathead Indian Reservation for the exclusive use and benefit of the Salish, Pend d'Oreille, and Kootenai tribes.

In 1809, David Thompson of the Northwest Fur Company established Salish House, a trading post on the Clark Fork River near Thompson Falls. In 1811, Thompson traveled up the Thompson and Fisher Rivers, passing within a few miles of

Pleasant Valley. This record is the first documented evidence of nonnative presence in this soil survey area.

In 1857, Joe Ashley made the first documented nonnative settlement in the upper Flathead Valley near the creek that now bears his name. Settlement of the area increased in the 1880s. The town of Demersville was established on the Flathead River, southeast of present-day Kalispell. The first sawmill in the Flathead Valley was a water-powered mill built near Foys Lake in 1884.

Much of the land in this soil survey area was originally part of a railroad land grant signed into law in 1864 by President Abraham Lincoln. The intention of the land grant was to provide the railroad with capital to complete the Northern Pacific Line from Lake Superior to the Pacific Coast. This rail line passed through the Flathead and Clark Fork River Valleys to the south.

In 1889, James J. Hill of the Great Northern Railway dispatched John F. Stevens from Havre, Montana, to find the route through the Rocky Mountains across what would later be named Marias Pass. At the same time, Hill sent Charles Frederick Beals Haskell to find a route from the pass down to the Flathead Valley and on to the west. Haskell surveyed the route west from Kalispell through Smith Valley, Kila (originally called Sedan), Marion, past Bitterroot Lake, over what is now called Haskell Pass, through Pleasant Valley, past Lynch and Island Lakes, to Wolf Creek and the Kootenai River. The railroad was built to Kalispell in 1891. The stretch from Kalispell to Libby was completed in just 4 months in 1892, using mostly immigrant laborers and requiring the construction of two large trestles, a 1,415 foot-long tunnel, and high fills of rock to bring the railroad up to grade over Haskell Pass. Evidence of these engineering feats remains, and miles of the old railroad grade have recently been converted to bike and walking trails between Kalispell and Kila. The railroad line carried one passenger train per day headed west and one train a day headed east.

In 1893, Flathead County was created out of Missoula County. Pleasant Valley was first settled in the 1880s by cattlemen coming up from the plains area to the south and using the valley for summer range. Completion of the railroad greatly enhanced the lumber industry and settlement west of Kalispell. The first loggers used axes and crosscut saws to fell trees. High-cut stumps with springboard notches are still scattered through the woods in the Pleasant Valley area. Sawmills were operated at the Sedan siding at Smith Lake, at Marion, and at Pleasant Valley, as well as other locations. A post office operated at Pleasant Valley Station from 1903 until 1935. Of the many railroad sidings that were established in the area during this period, Kila and Marion remain today.

In 1904, the Great Northern Railway abandoned the line west of Kalispell because of the steep grade and number of curves in the track. An easier route was established from Columbia Falls to Whitefish and then north to Eureka and down the Kootenai River to Libby. This route remained until 1970, when the 7-mile-long Flathead Tunnel was completed, culminating a 60-mile relocation of the rail line to make way for Lake Koocanusa, soon to flood the Kootenai River Valley behind Libby Dam.

In 1909, Lincoln County was created out of Flathead County. Pleasant Valley Road opened in 1917, following the old railroad grade. Hubbart Dam was constructed on the Little Bitterroot River in 1923 to provide irrigation water for the Flathead Indian Reservation. Historic land use in the survey area has been cattle ranching and timber harvesting. Some exploratory mining has occurred. An oil-test well drilled in 1983 was a dry hole and was plugged. Recently, several rock quarries were developed in the area as the market for building stone and decorative rock expanded. Private and corporate land development is occurring at an accelerated pace.

The Lost Trail National Wildlife Refuge was established in 1999 from land that was originally the Pleasant Valley, the Jackson, and the Orr-Gardiner ranches.

## Geology

Michael Garverich, Montana State Geologist, Natural Resources Conservation Service, prepared this section.

The Soil Survey of Flathead County Area and Part of Lincoln County includes areas along the northwestern side of Flathead Lake and extends westward through the Pleasant Valley Fisher River area and along the Little Bitterroot River into the upper part of the Little Bitterroot Valley and Sullivan Creek area. The soil survey area lies west of the Rocky Mountain Trench and within the Belt Basin. This area mainly has a bedrock of various belt Supergroup Formations except in the area of Sullivan Creek where Tertiary Volcanics are exposed. Valley bottoms mostly have recent alluvium along the flood plains, but other areas commonly have glacial moraine, outwash, lake beds, or other sediments associated with the last (or older) glacial maximum and its associated lake/flood sediments.

Belt Supergroup rocks are dominated by carbonate and clastic sediments, sandstones, silts, and shales that have been metamorphosed to the lower greenschist facies. The clastic rocks are now quartzites, siltites, and argillites, and the carbonates show little metamorphic changes. In the vicinity of the soil survey, the clastic rocks are dominantly green in color but red to purple and white beds are locally present to common. The carbonates of the Helena Formation are limestones and dolomites that are commonly tan and brown. The quartzites and siltites are strong, resistant rocks, especially where thickly bedded, that produce skeletal soils. The argillites are soft and easily weathered and usually form thin beds in sections of quartzite and siltite. These rocks generally crop out in north-northwest striking bands with the Helena Formation extending from the Flathead Valley to just west of Ashley Lake, where it is cut off by a fault. A band of Burke, Pritchard, and Revett Formations extends westward to the vicinity of the Thompson River Valley.

A small area in the vicinity of Sullivan Creek has exposures of Tertiary volcanic rocks. These rocks were deposited by an extinct volcanic center that was active during the Oligocene. Rocks are primarily dacitic to rhyolitic in composition and are domes, small flows, and breccias pipes.

The Belt rocks have all been thrust eastward during Mesozoic to early Tertiary time (Cordilleran Orogeny) and then extended during middle to late Tertiary time (Basin and Range events). The result is a structurally complex area. Thrust faults are common in the Belt Basin and have generated multiple thrust sheets; most notable is the Lewis Thrust Sheet that carries Belt rocks over Cretaceous sediments along the eastern side of Glacier National Park to the east and lies at depth below the survey area. Other thrust sheets are present but obscured. The eastern side of the survey area is bounded by the Rocky Mountain Trench, a structural feature that extends into the Yukon, far to the north. In the Flathead region, the Rocky Mountain Trench is the result of a normal fault, downthrown to the west; this general area marks the eastern limit of extensional faulting. In the subsurface, this area seems to be the western limit of Paleozoic rocks and likely represents the eastward limit of thick Belt sedimentation. Many of the stream valleys in the area of the survey likely follow normal faults associated with Basin-and-Range extensional faulting.

Geological resources are limited in this area. The Hog Heaven District produced silver, lead, and some zinc and copper from Tertiary volcanic rocks and hydrothermal systems and was active into the 1960s. Presently, aggregate for construction is produced from Tertiary alluvium deposits, and different types of stone are quarried from various outcrops of Belt rocks. Oil exploration has revealed thick sequences of Belt rocks that have been metamorphosed and the oil and gas potential destroyed. Tertiary sediments along the stream valleys provide ground water for domestic and agricultural purposes. Minor amounts of ground water are found in fractured Belt rocks.

## Climate

Natural Resources Conservation Service, National Water and Climate Center, Portland, Oregon, prepared this section.

Climate data are provided in the tables “Temperature and Precipitation,” “Freeze Dates in Spring and Fall,” and “Growing Season.” The data were recorded at climate stations at Olney and Libby 32 SSE in the period 1971 through 2000. Note that there are no long-term climate stations within or adjacent to the soil survey area. However, the climate stations in this narrative are representative of the general climate of the soil survey. Thunderstorm days, relative humidity, percent sunshine, and wind information are estimated from the first-order station at Kalispell and climate atlases.

The “Temperature and Precipitation” table gives data on temperature and precipitation for the survey area as recorded at Olney and Libby 32 SSE. The “Freeze Dates in Spring and Fall” table shows probable dates of the last freeze in spring and the first freeze in fall. The “Growing Season” table provides data on the length of the growing season.

In summer, the average temperature is 60.0 degrees F at Olney and 57.8 degrees F at Libby 32 SSE. The average daily maximum summer temperature is 77.9 degrees F at Olney and 75.4 degrees F at Libby 32 SSE. At Olney, the highest temperature on record, 101 degrees F, occurred on July 9, 1985. At Libby 32 SSE, the highest temperature on record, 102 degrees F, occurred on August 4, 1961.

In winter, the average temperature is 22.2 degrees F at Olney and 23.1 degrees F at Libby 32 SSE. The average daily minimum winter temperature is 13.4 degrees F at Olney and 14.4 degrees F at Libby 32 SSE. At Olney, the lowest temperature on record, -44 degrees F, occurred on December 29, 1990. At Libby 32 SSE, the lowest temperature on record, -44 degrees F, occurred on January 30, 1950.

Growing-degree days, equivalent to “heat units,” are shown in the “Temperature and Precipitation” table. During the month, growing-degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

At Olney, the average annual total precipitation is about 23.08 inches. Of this amount, about 3.39 inches, or 15 percent, usually falls from July through August. At Libby 32 SSE, the average annual total precipitation is about 24.30 inches. Of this amount, about 2.46 inches, or 10 percent, usually falls from July through August. The growing season for most crops falls within this period.

At Olney, the heaviest 1-day rainfall on record, 2.02 inches, occurred on June 22, 1967. At Libby 32 SSE, the heaviest 1-day rainfall on record, 2.77 inches, occurred on June 8, 1964. Thunderstorms occur on about 20 days each year, and most occur in July.

The average seasonal snowfall is 111.5 inches at Olney and 96.1 inches at Libby 32 SSE. At Olney, the greatest snow depth at any one time on record, 77 inches, occurred on January 9, 1991. At Libby 32 SSE, the greatest snow depth at any one time on record, 55 inches, occurred on January 24, 1954.

On average, 69 days of the year have at least 1 inch of snow on the ground at Olney and 136 days at Libby 32 SSE. At Olney, the heaviest 1-day snowfall on record, 20 inches, occurred on December 30, 1996. At Libby 32 SSE, the heaviest 1-day snowfall on record, 18.1 inches, occurred on November 19, 1966.

The average relative humidity in midafternoon is about 56 percent. Humidity is higher at night, and the average at dawn is about 84 percent. The sun shines 68 percent of the time in summer and 28 percent in winter. The prevailing wind is from the south. Average wind speed is highest, 8.0 miles per hour, in April.

## How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends up to 2 meters deep from the surface down into the unconsolidated material in which the soil formed.

The soils and miscellaneous areas in the survey area are in a pattern related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape transition to another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to record boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists.

Dryland small-grain yields (spring wheat, winter wheat, oats, and barley), as presented in the certified soils database and related publications in Montana, are generated using a Crop Yield Model (MT-CYM). This model is based on Montana Agricultural Experiment Station Report 35 (AES-35). AES-35 was revised, verified, and tested to encompass all dryland-cropped soils in the state from 1990 to the present, as the MT-CYM was programmed and maintained in the NRCS soils database. The resulting model consistently generates credible yields that are stored not as traditional

data but generated as the soils data is certified and, subsequently, included as interpretation results.

Crop yields provided in this publication other than for dryland small grains are database stored and gathered more traditionally, through yield reporting, farmer interviews, and other yield studies.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods, but they are less predictable year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the context of climate and vegetation in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in recording boundaries.

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# Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of an area for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class, there are precisely defined limits for soil properties. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Some minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They are not mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and, consequently, they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all of the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. The soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most

of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Minesinger gravelly loam, cool, 4 to 15 percent slopes, stony is a phase of the Minesinger series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

This survey includes complexes. They consist of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Whitebear-Dahlake complex, 0 to 2 percent slopes is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Water is an example.

The “Acreage and Proportionate Extent of the Soils” table gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The “Glossary” defines many of the terms used in describing the soils.

## 15B—Lostprairie-Whitebear complex, 0 to 4 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,500 to 3,600 feet
*Mean annual precipitation:* 17 to 21 inches
*Frost-free period:* 70 to 100 days

### *Component Description*

**Lostprairie and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Lake terrace
*Slope:* 0 to 4 percent
*Elevation:* 3,500 to 3,600 feet
*Effective annual precipitation:* 17 to 21 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat poorly drained
*Parent material:* Volcanic ash over glaciolacustrine deposits
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 9.1 inches
*Typical profile:*
A—0 to 10 inches; ashy silt loam
2E—10 to 26 inches; silt
2Bt—26 to 44 inches; silty clay loam
2C1—44 to 52 inches; silt loam
2C2—52 to 60 inches; silt

**Whitebear and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Lake terrace
*Slope:* 0 to 2 percent
*Elevation:* 3,500 to 3,600 feet
*Effective annual precipitation:* 17 to 21 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Silt loam
*Depth to restrictive feature:* Natric: 8 to 18 inches
*Drainage class:* Somewhat poorly drained
*Parent material:* Glaciolacustrine deposits
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Sodium affected:* Sodic within 30 inches
*Available water capacity:* Mainly 2.4 inches
*Typical profile:*
E—0 to 10 inches; silt loam
E/Btn—10 to 13 inches; silt loam
Btn—13 to 18 inches; loam
BC—18 to 23 inches; silt loam
C—23 to 60 inches; silt loam

### *Additional Components*

*Half Moon and similar soils:* 10 percent
*Dahlake and similar soils:* 5 percent
*Half Moon, cool and similar soils:* 5 percent
*Tallcreek and similar soils:* 5 percent
*Wimper and similar soils:* 5 percent

## 17A—Whitebear-Dahlake complex, 0 to 2 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,100 to 3,600 feet
*Mean annual precipitation:* 17 to 21 inches
*Frost-free period:* 75 to 100 days

### *Component Description*

**Whitebear and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Flood plain, lake terrace
*Slope:* 0 to 2 percent
*Elevation:* 3,100 to 3,600 feet
*Effective annual precipitation:* 17 to 21 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Silt loam
*Depth to restrictive feature:* Natric: 8 to 18 inches
*Drainage class:* Somewhat poorly drained
*Parent material:* Lacustrine deposits
*Native plant cover type:* Rangeland
*Flooding:* Rare

*Water table:* Present
*Sodium affected:* Sodic within 30 inches
*Available water capacity:* Mainly 2.4 inches
*Typical profile:*
E—0 to 10 inches; silt loam
E/Btn—10 to 13 inches; silt loam
Btn—13 to 18 inches; loam
BC—18 to 23 inches; silt loam
C—23 to 60 inches; silt loam

**Dahlake and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Flood plain, lake terrace
*Slope:* 0 to 2 percent
*Elevation:* 3,100 to 3,600 feet
*Effective annual precipitation:* 17 to 21 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Lacustrine deposits
*Native plant cover type:* Rangeland
*Flooding:* Frequent
*Water table:* Present
*Sodium affected:* Sodic within 30 inches
*Available water capacity:* Mainly 10.1 inches
*Typical profile:*
A—0 to 8 inches; silt loam
Bw—8 to 19 inches; silt loam
BC—19 to 27 inches; silt loam
C—27 to 60 inches; silt loam

### *Additional Components*

*Meadowpeak and similar soils:* 10 percent

## 21—Bowlake-Minesinger gravelly loams, 8 to 15 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 2,800 to 3,400 feet
*Mean annual precipitation:* 14 to 18 inches
*Frost-free period:* 80 to 100 days

### *Component Description*

**Bowlake and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Relict stream terrace
*Slope:* 8 to 15 percent, south to northwest aspects
*Elevation:* 2,800 to 3,400 feet
*Effective annual precipitation:* 14 to 18 inches
*Frost-free period:* 80 to 100 days

*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 6.8 inches
*Typical profile:*
A—0 to 11 inches; gravelly loam
Bt/E—11 to 19 inches; gravelly clay loam
Bt—19 to 32 inches; gravelly clay
Bk—32 to 51 inches; very gravelly clay loam
C—51 to 60 inches; gravelly sandy clay loam

**Minesinger and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Relict stream terrace
*Slope:* 8 to 15 percent, south to northwest aspects
*Elevation:* 2,800 to 3,400 feet
*Effective annual precipitation:* 14 to 18 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.9 inches
*Typical profile:*
A—0 to 14 inches; gravelly loam
E/B—14 to 24 inches; very cobbly loam
Bt1—24 to 32 inches; very cobbly clay loam
Bt2—32 to 39 inches; very cobbly clay
Bk—39 to 60 inches; very cobbly clay loam

### *Additional Components*

*Bigarm and similar soils:* 5 percent
*Kerl and similar soils:* 5 percent
*Niarada and similar soils:* 5 percent

## 21D—Combest gravelly ashy silt loam, 4 to 15 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,800 to 4,800 feet
*Mean annual precipitation:* 19 to 22 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Combest and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Mountain slope
*Slope:* 4 to 15 percent
*Elevation:* 3,800 to 4,800 feet
*Effective annual precipitation:* 19 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
Bw—2 to 12 inches; gravelly ashy silt loam
2E—12 to 26 inches; very gravelly sandy loam
2E/Bw—26 to 60 inches; extremely cobbly coarse sandy loam

### *Additional Components*

*Sharrott and similar soils:* 5 percent
*Winkler and similar soils:* 5 percent

## 21E—Combest gravelly ashy silt loam, 15 to 35 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,200 to 5,200 feet
*Mean annual precipitation:* 19 to 22 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Combest and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent, southeast to southwest aspects
*Elevation:* 3,200 to 5,200 feet
*Effective annual precipitation:* 19 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches

*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
Bw—2 to 12 inches; gravelly ashy silt loam
2E—12 to 26 inches; very gravelly sandy loam
2E/Bw—26 to 60 inches; extremely cobbly coarse sandy loam

### *Additional Components*

*Combest, greater slope and similar soils:* 5 percent
*Winkler and similar soils:* 5 percent

## 21F—Combest gravelly ashy silt loam, 35 to 60 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,500 to 5,400 feet
*Mean annual precipitation:* 19 to 22 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Combest and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent, southeast to southwest aspects
*Elevation:* 3,500 to 5,400 feet
*Effective annual precipitation:* 19 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
Bw—2 to 12 inches; gravelly ashy silt loam
2E—12 to 26 inches; very gravelly sandy loam
2E/Bw—26 to 60 inches; extremely cobbly coarse sandy loam

### *Additional Components*

*Winkler and similar soils:* 4 percent
*Rock outcrop:* 3 percent
*Rubble land:* 3 percent

## 22E—Winkler gravelly sandy loam, cool, 15 to 35 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,000 to 5,600 feet
*Mean annual precipitation:* 17 to 30 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Winkler and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 3,000 to 5,600 feet
*Effective annual precipitation:* 17 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Colluvium derived from quartzite and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 4.1 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 10 inches; gravelly sandy loam
E—10 to 36 inches; extremely gravelly sandy loam
E/Bw—36 to 60 inches; extremely gravelly sandy loam

### *Additional Components*

*Wildgen and similar soils:* 4 percent
*Winkler, greater slope and similar soils:* 3 percent
*Sharrott and similar soils:* 2 percent
*Rock outcrop:* 1 percent

## 22F—Winkler gravelly sandy loam, cool, 35 to 60 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,000 to 5,600 feet
*Mean annual precipitation:* 17 to 30 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Winkler and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Mountain slope

*Slope:* 35 to 60 percent
*Elevation:* 3,000 to 5,600 feet
*Effective annual precipitation:* 17 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Colluvium derived from quartzite and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 4.1 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 10 inches; gravelly sandy loam
E—10 to 36 inches; extremely gravelly sandy loam
E/Bw—36 to 60 inches; extremely gravelly sandy loam

### *Additional Components*

*Rock outcrop:* 4 percent
*Rubble land:* 4 percent
*Sharrott and similar soils:* 2 percent

## 30E—Tevis gravelly loam, 15 to 35 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,300 to 6,000 feet
*Mean annual precipitation:* 24 to 30 inches
*Frost-free period:* 40 to 90 days

### *Component Description*

**Tevis and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent, north to east aspects
*Elevation:* 3,300 to 6,000 feet
*Effective annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Colluvium
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 3.5 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 9 inches; gravelly loam
E/Bw—9 to 22 inches; extremely gravelly loam
C—22 to 60 inches; extremely gravelly loam

### *Additional Components*

*Holloway and similar soils:* 5 percent
*Tevis, greater slope and similar soils:* 5 percent

## 30F—Tevis gravelly loam, 35 to 60 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,300 to 6,000 feet
*Mean annual precipitation:* 24 to 30 inches
*Frost-free period:* 40 to 95 days

### *Component Description*

**Tevis and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent, west to east aspects
*Elevation:* 3,300 to 6,000 feet
*Effective annual precipitation:* 27 to 33 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Colluvium
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 3.5 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 9 inches; gravelly loam
E/Bw—9 to 22 inches; extremely gravelly loam
C—22 to 60 inches; extremely gravelly loam

### *Additional Components*

*Holloway and similar soils:* 5 percent
*Rubble land:* 5 percent
*Winkler and similar soils:* 5 percent

## 31E—Tevis gravelly loam, dry, 15 to 35 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,600 to 5,100 feet
*Mean annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Tevis and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent, east to west aspects
*Elevation:* 3,600 to 5,100 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 3.8 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E1—1 to 12 inches; gravelly loam
E2—12 to 21 inches; very gravelly loam
E/Bw—21 to 60 inches; extremely gravelly fine sandy loam

### *Additional Components*

*Mitten and similar soils:* 5 percent
*Tevis, greater slope and similar soils:* 5 percent

## 32E—Mitten gravelly ashy silt loam, 15 to 35 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,400 to 6,000 feet
*Mean annual precipitation:* 24 to 40 inches
*Frost-free period:* 40 to 90 days

### *Component Description*

**Mitten and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent
*Elevation:* 3,400 to 6,000 feet
*Effective annual precipitation:* 24 to 40 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over colluvium
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 4.2 inches

*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
Bw—2 to 9 inches; gravelly ashy silt loam
2E—9 to 25 inches; very gravelly loam
2E/Bw—25 to 60 inches; extremely gravelly loam

### *Additional Components*

*Holloway and similar soils:* 5 percent
*Mitten, greater slope and similar soils:* 5 percent
*Tevis and similar soils:* 5 percent

## 32F—Mitten gravelly ashy silt loam, 35 to 60 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,400 to 6,000 feet
*Mean annual precipitation:* 25 to 40 inches
*Frost-free period:* 40 to 90 days

### *Component Description*

**Mitten and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent
*Elevation:* 3,400 to 6,000 feet
*Effective annual precipitation:* 25 to 40 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over colluvium
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 4.2 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
Bw—2 to 9 inches; gravelly ashy silt loam
2E—9 to 25 inches; very gravelly loam
2E/Bw—25 to 60 inches; extremely gravelly loam

### *Additional Components*

*Holloway and similar soils:* 4 percent
*Rubble land:* 3 percent
*Tevis and similar soils:* 3 percent

## 33E—Mitten gravelly ashy silt loam, dry, 15 to 35 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,400 to 5,200 feet
*Mean annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Mitten and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent, south to northwest aspects
*Elevation:* 3,400 to 5,200 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.7 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 10 inches; gravelly ashy silt loam
2E—10 to 14 inches; very gravelly loam
2E/Bw—14 to 30 inches; very gravelly very fine sandy loam
2BC—30 to 60 inches; extremely gravelly fine sandy loam

### *Additional Components*

*Mitten, greater slope and similar soils:* 5 percent
*Tevis and similar soils:* 5 percent

## 33F—Mitten gravelly ashy silt loam, dry, 35 to 60 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 4,000 to 5,400 feet
*Mean annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Mitten and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent, south to northwest aspects
*Elevation:* 4,000 to 5,400 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.7 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 10 inches; gravelly ashy silt loam
2E—10 to 14 inches; very gravelly loam
2E/Bw—14 to 30 inches; very gravelly very fine sandy loam
2BC—30 to 60 inches; extremely gravelly fine sandy loam

### *Additional Components*

*Rock outcrop:* 5 percent
*Rubble land:* 5 percent
*Tevis and similar soils:* 5 percent

## 34E—Winfall gravelly loam, 8 to 30 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,600 to 4,200 feet
*Mean annual precipitation:* 22 to 28 inches
*Frost-free period:* 40 to 90 days

### *Component Description*

**Winfall and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, northwest to east aspects
*Elevation:* 3,600 to 4,200 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till and/or drift derived from argillite and/or quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.0 inches

*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 9 inches; gravelly loam
E/Bw—9 to 60 inches; very gravelly loam

### *Additional Components*

*Courville and similar soils:* 5 percent
*Waldbillig and similar soils:* 5 percent
*Winfall, greater slope and similar soils:* 4 percent
*Tevis and similar soils:* 1 percent

## 35D—Courville-Winfall complex, 4 to 15 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,500 to 4,400 feet
*Mean annual precipitation:* 24 to 30 inches
*Frost-free period:* 35 to 90 days

### *Component Description*

**Courville and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Moraine
*Slope:* 4 to 15 percent
*Elevation:* 3,500 to 4,400 feet
*Effective annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.2 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 10 inches; gravelly ashy silt loam
2E—10 to 22 inches; very cobbly fine sandy loam
2E/Bw—22 to 60 inches; very cobbly fine sandy loam

**Winfall and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Moraine
*Slope:* 4 to 15 percent
*Elevation:* 3,500 to 4,400 feet
*Effective annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till

*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.0 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 9 inches; gravelly loam
E and Bt—9 to 60 inches; very gravelly loam

### *Additional Components*

*Pleasantvalley and similar soils:* 10 percent
*Courville, dry and similar soils:* 5 percent
*Meadowpeak and similar soils:* 5 percent
*Tallcreek and similar soils:* 5 percent
*Waldbillig and similar soils:* 5 percent

## 35E—Courville-Pleasantvalley complex, 8 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,510 to 5,000 feet
*Mean annual precipitation:* 24 to 30 inches
*Frost-free period:* 40 to 90 days

### *Component Description*

**Courville and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, west to northeast aspects
*Elevation:* 3,510 to 5,000 feet
*Effective annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.2 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 10 inches; gravelly ashy silt loam
2E—10 to 22 inches; very cobbly fine sandy loam
2E/Bw—22 to 60 inches; very cobbly fine sandy loam

**Pleasantvalley and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, west to northeast aspects
*Elevation:* 3,510 to 5,000 feet
*Effective annual precipitation:* 24 to 30 inches

*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly ashy silt loam
Bw—4 to 14 inches; gravelly ashy silt loam
2E—14 to 26 inches; very cobbly silt loam
2E/Bw—26 to 34 inches; very cobbly silt loam
2E/Bt—34 to 60 inches; very cobbly silt loam

### *Additional Components*

*Lynchlake and similar soils:* 10 percent
*Waldbillig and similar soils:* 8 percent
*Courville, dry and similar soils:* 5 percent
*Winfall and similar soils:* 5 percent
*Courville, greater slope and similar soils:* 2 percent

## 35F—Courville-Stevie-Winfall complex, 30 to 50 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,650 to 5,200 feet
*Mean annual precipitation:* 26 to 34 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Courville and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Moraine
*Slope:* 30 to 50 percent, west to northeast aspects
*Elevation:* 3,650 to 5,200 feet
*Effective annual precipitation:* 26 to 34 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.2 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 10 inches; gravelly ashy silt loam

2E—10 to 22 inches; very cobbly fine sandy loam
2E/Bw—22 to 60 inches; very cobbly fine sandy loam

**Stevie and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Glaciated mountain slope
*Slope:* 30 to 50 percent, west to northeast aspects
*Elevation:* 3,650 to 5,200 feet
*Effective annual precipitation:* 26 to 34 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 2 inches; gravelly ashy silt loam
Bw—2 to 18 inches; gravelly ashy silt loam
2E/Bw—18 to 43 inches; very cobbly sandy loam
2C—43 to 60 inches; extremely gravelly sandy loam

**Winfall and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Moraine
*Slope:* 30 to 50 percent, west to northeast aspects
*Elevation:* 3,650 to 5,200 feet
*Effective annual precipitation:* 26 to 34 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.0 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 9 inches; gravelly loam
E and Bt—9 to 60 inches; very gravelly loam

### *Additional Components*

*Glaciercreek and similar soils:* 10 percent
*Rock outcrop:* 5 percent

## 39D—Courville-Rumblecreek complex, 4 to 15 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains

*Elevation:* 3,600 to 4,500 feet
*Mean annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Courville and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Moraine
*Slope:* 4 to 15 percent
*Elevation:* 3,600 to 4,500 feet
*Effective annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite and/or siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.2 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 10 inches; gravelly ashy silt loam
2E—10 to 22 inches; very cobbly fine sandy loam
2E/Bw—22 to 60 inches; very cobbly fine sandy loam

**Rumblecreek and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Moraine
*Slope:* 4 to 15 percent
*Elevation:* 3,600 to 4,500 feet
*Effective annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from quartzite and/or siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.8 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 12 inches; gravelly loam
E/Bt—12 to 15 inches; gravelly loam
Bt/E—15 to 28 inches; very gravelly clay loam
Bt—28 to 60 inches; very gravelly clay loam

### *Additional Components*

*Lozeau, deep and similar soils:* 10 percent
*Mitten and similar soils:* 10 percent
*Rock outcrop:* 5 percent

# 40D—Rumblecreek-Courville complex, dry, 4 to 15 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,200 to 4,600 feet
*Mean annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Rumblecreek and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Moraine
*Slope:* 4 to 15 percent
*Elevation:* 3,200 to 4,600 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from quartzite and/or siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.8 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 12 inches; gravelly loam
E/Bt—12 to 15 inches; gravelly loam
Bt/E—15 to 28 inches; very gravelly clay loam
Bt—28 to 60 inches; very gravelly clay loam

**Courville and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Moraine
*Slope:* 4 to 15 percent
*Elevation:* 3,200 to 4,600 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite and/or siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.2 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 10 inches; gravelly ashy silt loam
2E—10 to 22 inches; very cobbly fine sandy loam
2E/Bw—22 to 60 inches; very cobbly fine sandy loam

### *Additional Components*

*Lozeau, deep and similar soils:* 10 percent
*Combest and similar soils:* 5 percent
*Mitten and similar soils:* 5 percent
*Pashua, deep and similar soils:* 5 percent
*Rock outcrop:* 5 percent

## 40E—Rumblecreek-Courville complex, dry, 15 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,150 to 4,800 feet
*Mean annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Rumblecreek and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Moraine
*Slope:* 15 to 30 percent, east to northwest aspects
*Elevation:* 3,150 to 4,800 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from quartzite and/or siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.8 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 12 inches; gravelly loam
E/Bt—12 to 15 inches; gravelly loam
Bt/E—15 to 28 inches; very gravelly clay loam
Bt—28 to 60 inches; very gravelly clay loam

**Courville and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Moraine
*Slope:* 15 to 30 percent, east to northwest aspects
*Elevation:* 3,150 to 4,800 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite and/or siltstone
*Native plant cover type:* Forestland
*Flooding:* None

*Available water capacity:* Mainly 6.2 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 10 inches; gravelly ashy silt loam
2E—10 to 22 inches; very cobbly fine sandy loam
2E/Bw—22 to 60 inches; very cobbly fine sandy loam

### *Additional Components*

*Lozeau, deep and similar soils:* 10 percent
*Combest and similar soils:* 5 percent
*Mitten and similar soils:* 5 percent
*Pashua, deep and similar soils:* 5 percent
*Rock outcrop:* 5 percent

## 41F—Courville, dry-Rumblecreek, dry-Lozeau, deep complex, 30 to 60 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,100 to 3,800 feet
*Mean annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Courville and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Escarpment
*Slope:* 30 to 60 percent, south to northeast aspects
*Elevation:* 3,100 to 3,800 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite and/or siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.2 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 10 inches; gravelly ashy silt loam
2E—10 to 22 inches; very cobbly fine sandy loam
2E/Bw—22 to 60 inches; very cobbly fine sandy loam

**Rumblecreek and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Escarpment
*Slope:* 30 to 60 percent, south to northeast aspects
*Elevation:* 3,100 to 3,800 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days

*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from quartzite and/or siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.8 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 12 inches; gravelly loam
E/Bt—12 to 15 inches; gravelly loam
Bt/E—15 to 28 inches; very gravelly clay loam
Bt—28 to 60 inches; very gravelly clay loam

**Lozeau, deep and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Escarpment
*Slope:* 30 to 60 percent, south to northeast aspects
*Elevation:* 3,100 to 3,800 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.9 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 3 inches; gravelly loam
E—3 to 9 inches; gravelly loam
E/Bw—9 to 26 inches; gravelly loam
Bt/E—26 to 41 inches; gravelly clay loam
BC—41 to 56 inches; gravelly loam
Cr—56 to 60 inches; bedrock

### *Additional Components*

*Mitten and similar soils:* 10 percent
*Rock outcrop:* 5 percent
*Tamarack and similar soils:* 5 percent

## 44D—Mitten gravelly ashy silt loam, dry, 8 to 15 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 4,200 to 6,000 feet
*Mean annual precipitation:* 25 to 40 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Mitten and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 15 percent, south to northwest aspects
*Elevation:* 4,200 to 6,000 feet
*Effective annual precipitation:* 25 to 40 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.7 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 10 inches; gravelly ashy silt loam
2E—10 to 14 inches; very gravelly loam
2E/Bw—14 to 30 inches; very gravelly very fine sandy loam
2BC—30 to 60 inches; extremely gravelly fine sandy loam

### *Additional Components*

*Mitten, greater slope and similar soils:* 5 percent
*Tevis and similar soils:* 5 percent

## 45D—Waldbillig gravelly ashy silt loam, 4 to 15 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,500 to 5,400 feet
*Mean annual precipitation:* 30 to 50 inches
*Frost-free period:* 40 to 70 days

### *Component Description*

**Waldbillig and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Moraine
*Slope:* 4 to 15 percent, northwest to north aspects
*Elevation:* 3,500 to 5,400 feet
*Effective annual precipitation:* 30 to 50 inches
*Frost-free period:* 40 to 70 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches

*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
Bw—2 to 11 inches; gravelly ashy silt loam
2E—11 to 17 inches; very gravelly fine sandy loam
2E and Bt—17 to 60 inches; very gravelly loam

### *Additional Components*

*Bata and similar soils:* 10 percent

## 45E—Waldbillig gravelly ashy silt loam, 15 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 4,100 to 5,400 feet
*Mean annual precipitation:* 30 to 50 inches
*Frost-free period:* 40 to 70 days

### *Component Description*

**Waldbillig and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Moraine
*Slope:* 15 to 30 percent, west to northeast aspects
*Elevation:* 4,100 to 5,400 feet
*Effective annual precipitation:* 30 to 50 inches
*Frost-free period:* 40 to 70 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
Bw—2 to 11 inches; gravelly ashy silt loam
2E—11 to 17 inches; very gravelly fine sandy loam
2E and Bt—17 to 60 inches; very gravelly loam

### *Additional Components*

*Bata and similar soils:* 10 percent
*Waldbillig, greater slope and similar soils:* 5 percent

## 45F—Waldbillig gravelly ashy silt loam, 30 to 60 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2

*Landscape:* Mountains
*Elevation:* 4,000 to 5,400 feet
*Mean annual precipitation:* 30 to 50 inches
*Frost-free period:* 40 to 90 days

### *Component Description*

**Waldbillig and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Moraine
*Slope:* 30 to 60 percent, west to northeast aspects
*Elevation:* 4,000 to 5,400 feet
*Effective annual precipitation:* 30 to 50 inches
*Frost-free period:* 40 to 70 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
Bw—2 to 11 inches; gravelly ashy silt loam
2E—11 to 17 inches; very gravelly fine sandy loam
2E and Bt—17 to 60 inches; very gravelly loam

### *Additional Components*

*Courville and similar soils:* 5 percent
*Rubble land:* 5 percent
*Stevie and similar soils:* 5 percent

## 47D—Holloway gravelly ashy silt loam, 4 to 15 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 4,600 to 5,400 feet
*Mean annual precipitation:* 30 to 60 inches
*Frost-free period:* 40 to 70 days

### *Component Description*

**Holloway and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 4 to 15 percent
*Elevation:* 4,600 to 5,400 feet
*Effective annual precipitation:* 30 to 60 inches
*Frost-free period:* 40 to 70 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained

*Parent material:* Volcanic ash over colluvium derived from argillite or quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 4.0 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
A—2 to 11 inches; gravelly ashy silt loam
2E—11 to 23 inches; extremely gravelly fine sandy loam
2E/Bw—23 to 43 inches; extremely gravelly fine sandy loam
2C—43 to 60 inches; extremely gravelly sandy loam

### *Additional Components*

*Holloway, greater slope and similar soils:* 8 percent
*Holloway, cool and similar soils:* 4 percent
*Rock outcrop:* 3 percent

## 47E—Holloway gravelly ashy silt loam, 15 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 4,400 to 5,600 feet
*Mean annual precipitation:* 30 to 60 inches
*Frost-free period:* 35 to 70 days

### *Component Description*

**Holloway and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 30 percent, northwest to northeast aspects
*Elevation:* 4,400 to 5,600 feet
*Effective annual precipitation:* 30 to 60 inches
*Frost-free period:* 40 to 70 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over colluvium derived from argillite or quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 4.0 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
A—2 to 11 inches; gravelly ashy silt loam
2E—11 to 23 inches; extremely gravelly fine sandy loam
2E/Bw—23 to 43 inches; extremely gravelly fine sandy loam
2C—43 to 60 inches; extremely gravelly sandy loam

### *Additional Components*

*Holloway, greater slope and similar soils:* 4 percent
*Holloway, cool and similar soils:* 4 percent

*Waldbillig and similar soils:* 4 percent
*Rock outcrop:* 3 percent

## 47F—Holloway gravelly ashy silt loam, 30 to 60 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 4,500 to 5,700 feet
*Mean annual precipitation:* 30 to 60 inches
*Frost-free period:* 35 to 70 days

### *Component Description*

**Holloway and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 30 to 60 percent, west to northeast aspects
*Elevation:* 4,500 to 5,700 feet
*Effective annual precipitation:* 30 to 60 inches
*Frost-free period:* 40 to 70 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over colluvium derived from argillite or quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 4.0 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
A—2 to 11 inches; gravelly ashy silt loam
2E—11 to 23 inches; extremely gravelly fine sandy loam
2E/Bw—23 to 43 inches; extremely gravelly fine sandy loam
2C—43 to 60 inches; extremely gravelly sandy loam

### *Additional Components*

*Holloway, cool and similar soils:* 5 percent
*Rock outcrop:* 5 percent
*Waldbillig and similar soils:* 5 percent

## 50B—Bigarm gravelly loam, 2 to 8 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 2,600 to 5,500 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 80 to 100 days

### *Component Description*

**Bigarm and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Hill
*Slope:* 2 to 8 percent, south to west aspects
*Elevation:* 2,600 to 5,500 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Alluvium and/or colluvium derived from argillite and/or quartzite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches
*Typical profile:*
A—0 to 11 inches; gravelly loam
Bw—11 to 26 inches; very gravelly loam
C—26 to 60 inches; extremely gravelly loamy sand

### *Additional Components*

*Bigarm, greater slope and similar soils:* 5 percent
*Minesinger and similar soils:* 5 percent

## 50D—Bigarm gravelly loam, 8 to 15 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 2,600 to 5,500 feet
*Mean annual precipitation:* 14 to 19 inches
*Frost-free period:* 80 to 100 days

### *Component Description*

**Bigarm and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Hill
*Slope:* 8 to 15 percent
*Elevation:* 2,600 to 5,500 feet
*Effective annual precipitation:* 14 to 19 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Alluvium and/or colluvium derived from argillite and/or quartzite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches
*Typical profile:*
A—0 to 11 inches; gravelly loam
Bw—11 to 26 inches; very gravelly loam
C—26 to 60 inches; extremely gravelly loamy sand

### *Additional Components*

*Bigarm, greater slope and similar soils:* 5 percent
*Minesinger and similar soils:* 5 percent

## 50E—Bigarm gravelly loam, 15 to 30 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Elevation:* 2,600 to 5,500 feet
*Mean annual precipitation:* 14 to 19 inches
*Frost-free period:* 80 to 100 days

### *Component Description*

**Bigarm and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Hill
*Slope:* 15 to 30 percent
*Elevation:* 2,600 to 5,500 feet
*Effective annual precipitation:* 14 to 19 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Colluvium derived from argillite and quartzite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches
*Typical profile:*
A—0 to 11 inches; gravelly loam
Bw—11 to 26 inches; very gravelly loam
C—26 to 60 inches; extremely gravelly loamy sand

### *Additional Components*

*Bigarm, greater slope and similar soils:* 4 percent
*Hogsby and similar soils:* 4 percent
*Rock outcrop:* 1 percent
*Rubble land:* 1 percent

## 52D—Bigarm gravelly loam, cool, 4 to 15 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 2,600 to 5,500 feet
*Mean annual precipitation:* 14 to 19 inches
*Frost-free period:* 75 to 100 days

### *Component Description*

**Bigarm and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Hill

*Slope:* 4 to 15 percent, southwest to northwest aspects
*Elevation:* 2,600 to 5,500 feet
*Effective annual precipitation:* 14 to 19 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Alluvium and/or colluvium derived from argillite and/or quartzite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches
*Typical profile:*
A—0 to 14 inches; gravelly loam
Bw—14 to 29 inches; very gravelly loam
C—29 to 60 inches; extremely gravelly loamy sand

### *Additional Components*

*Bigarm, greater slope and similar soils:* 4 percent
*Hogsby and similar soils:* 4 percent
*Minesinger and similar soils:* 4 percent
*Rock outcrop:* 3 percent

## 52E—Bigarm gravelly loam, cool, 15 to 30 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Elevation:* 2,600 to 5,500 feet
*Mean annual precipitation:* 14 to 19 inches
*Frost-free period:* 75 to 95 days

### *Component Description*

**Bigarm and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Hill
*Slope:* 15 to 30 percent
*Elevation:* 2,600 to 5,500 feet
*Effective annual precipitation:* 14 to 19 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Colluvium derived from argillite and quartzite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches
*Typical profile:*
A—0 to 14 inches; gravelly loam
Bw—14 to 29 inches; very gravelly loam
C—29 to 60 inches; extremely gravelly loamy sand

### *Additional Components*

*Bigarm, greater slope and similar soils:* 5 percent
*Hogsby and similar soils:* 2 percent

*Rubble land:* 2 percent
*Rock outcrop:* 1 percent

## 54F—Finleypoint gravelly loam, 30 to 60 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,100 to 3,700 feet
*Mean annual precipitation:* 16 to 25 inches
*Frost-free period:* 75 to 100 days

### *Component Description*

**Finleypoint and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Hill
*Slope:* 30 to 60 percent, south to northwest aspects
*Elevation:* 3,100 to 3,700 feet
*Effective annual precipitation:* 16 to 25 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.0 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A1—1 to 9 inches; gravelly loam
A2—9 to 17 inches; very gravelly loam
E—17 to 39 inches; very gravelly sandy loam
E/Bw—39 to 60 inches; very gravelly sandy loam

### *Additional Components*

*Bigarm and similar soils:* 5 percent
*Finleypoint, greater slope and similar soils:* 5 percent
*Rock outcrop:* 5 percent

## 56—Finleypoint-Wildgen gravelly loams, 30 to 60 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,400 to 5,000 feet
*Mean annual precipitation:* 20 to 24 inches
*Frost-free period:* 70 to 100 days

### *Component Description*

**Finleypoint and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Mountain slope
*Slope:* 30 to 60 percent, east to south aspects
*Elevation:* 3,400 to 5,000 feet
*Effective annual precipitation:* 20 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium and/or till
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.1 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 11 inches; gravelly loam
E1—11 to 23 inches; very gravelly loam
E2—23 to 35 inches; very gravelly loam
E/Bw—35 to 60 inches; very gravelly loam

**Wildgen and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountain slope
*Slope:* 30 to 60 percent, east to south aspects
*Elevation:* 3,400 to 5,000 feet
*Effective annual precipitation:* 20 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium and/or till
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.6 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 7 inches; gravelly loam
E—7 to 18 inches; very gravelly loam
E and Bt—18 to 60 inches; very gravelly loam

### *Additional Components*

*Finleypoint, dry and similar soils:* 5 percent
*Bigarm and similar soils:* 4 percent
*Hogsby and similar soils:* 4 percent
*Rock outcrop:* 2 percent

# 56B—Bowlake-Minesinger gravelly loams, 2 to 8 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 2,700 to 3,400 feet
*Mean annual precipitation:* 14 to 18 inches
*Frost-free period:* 75 to 100 days

### *Component Description*

**Bowlake and similar soils**
*Composition:* 60 percent
*Geomorphic description:* Alluvial fan
*Slope:* 2 to 8 percent, south to southwest aspects
*Elevation:* 2,700 to 3,400 feet
*Effective annual precipitation:* 14 to 18 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Tertiary alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 6.8 inches
*Typical profile:*
A—0 to 9 inches; gravelly loam
Bt—9 to 24 inches; gravelly clay
Bk—24 to 60 inches; gravelly silty clay

**Minesinger and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Alluvial fan
*Slope:* 2 to 8 percent, south to southwest aspects
*Elevation:* 2,700 to 3,400 feet
*Effective annual precipitation:* 14 to 18 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Tertiary alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches
*Typical profile:*
A1—0 to 6 inches; gravelly loam
A2—6 to 13 inches; cobbly loam
Bt—13 to 24 inches; very gravelly clay
Bk—24 to 60 inches; very gravelly clay loam

### *Additional Components*

*Camascreek and similar soils:* 5 percent
*Minesinger, stony and similar soils:* 5 percent

## 57D—Minesinger gravelly loam, 4 to 15 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 2,700 to 4,500 feet
*Mean annual precipitation:* 14 to 18 inches
*Frost-free period:* 80 to 100 days

### *Component Description*

**Minesinger and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Alluvial fan, stream terrace
*Slope:* 4 to 15 percent
*Elevation:* 2,700 to 4,500 feet
*Effective annual precipitation:* 14 to 18 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Tertiary alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches
*Typical profile:*
A1—0 to 6 inches; gravelly loam
A2—6 to 13 inches; cobbly loam
Bt—13 to 24 inches; very gravelly clay
Bk—24 to 60 inches; very gravelly clay loam

### *Additional Components*

*Bowlake and similar soils:* 5 percent
*Minesinger, greater slope and similar soils:* 5 percent

## 59D—Minesinger gravelly loam, cool, 4 to 15 percent slopes, stony

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 2,700 to 4,500 feet
*Mean annual precipitation:* 14 to 18 inches
*Frost-free period:* 75 to 100 days

### *Component Description*

**Minesinger, stony and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Alluvial fan, stream terrace
*Slope:* 4 to 15 percent, south to west aspects
*Elevation:* 2,700 to 4,500 feet
*Effective annual precipitation:* 14 to 18 inches
*Frost-free period:* 75 to 95 days

*Surface layer texture:* Gravelly loam
*Rock fragments on the soil surface:* 0.01 to 0.10 percent stones
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Tertiary alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.3 inches
*Typical profile:*
A1—0 to 6 inches; gravelly loam
A2—6 to 13 inches; cobbly loam
Bt—13 to 24 inches; very gravelly clay
Bk—24 to 60 inches; very gravelly clay loam

### *Additional Components*

*Bowlake and similar soils:* 5 percent
*Minesinger, stony, greater slope and similar soils:* 5 percent

## 61E—McMannamy gravelly silt loam, 8 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,000 to 5,200 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**McMannamy and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, northeast to north aspects
*Elevation:* 3,000 to 5,200 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.2 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 11 inches; gravelly silt loam
Bt—11 to 22 inches; very gravelly silt loam
Bk—22 to 60 inches; very gravelly silt loam

### *Additional Components*

*Kingspoint and similar soils:* 5 percent
*McMannamy, greater slope and similar soils:* 5 percent

*Foyslake and similar soils:* 3 percent
*Rock outcrop:* 2 percent

## 61F—McMannamy gravelly silt loam, 30 to 50 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,000 to 5,400 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**McMannamy and similar soils**
*Composition:* 80 percent
*Geomorphic description:* Moraine
*Slope:* 30 to 50 percent, northwest to south aspects
*Elevation:* 3,000 to 5,400 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.2 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 11 inches; gravelly silt loam
Bt—11 to 22 inches; very gravelly silt loam
Bk—22 to 60 inches; very gravelly silt loam

### *Additional Components*

*Foyslake and similar soils:* 5 percent
*Kingspoint and similar soils:* 5 percent
*McMannamy, greater slope and similar soils:* 5 percent
*Rock outcrop:* 5 percent

## 64E—Finleypoint gravelly loam, moist, 15 to 30 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 2,900 to 5,000 feet
*Mean annual precipitation:* 16 to 25 inches
*Frost-free period:* 70 to 100 days

### *Component Description*

**Finleypoint and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Hill
*Slope:* 15 to 30 percent, southwest to north aspects
*Elevation:* 2,900 to 5,000 feet
*Effective annual precipitation:* 16 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.1 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 15 inches; gravelly loam
E—15 to 27 inches; very gravelly sandy loam
E/Bw—27 to 60 inches; very gravelly sandy loam

### *Additional Components*

*Bigarm and similar soils:* 5 percent
*Finleypoint, greater slope and similar soils:* 5 percent
*Rock outcrop:* 5 percent

## 66D—Battlebutte gravelly loam, 4 to 15 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,300 to 3,900 feet
*Mean annual precipitation:* 15 to 20 inches
*Frost-free period:* 80 to 100 days

### *Component Description*

**Battlebutte and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Hill
*Slope:* 4 to 15 percent
*Elevation:* 3,300 to 3,900 feet
*Effective annual precipitation:* 15 to 20 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.9 inches

*Typical profile:*
A—0 to 8 inches; gravelly loam
Bw1—8 to 13 inches; gravelly loam
Bw2—13 to 19 inches; gravelly loam
Cr—19 to 60 inches; bedrock

### *Additional Components*

*Rock outcrop, welded tuff:* 10 percent

## 66F—Battlebutte gravelly loam, 30 to 60 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Elevation:* 2,900 to 3,800 feet
*Mean annual precipitation:* 15 to 20 inches
*Frost-free period:* 80 to 100 days

### *Component Description*

**Battlebutte and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Hill
*Slope:* 30 to 60 percent
*Elevation:* 2,900 to 3,800 feet
*Effective annual precipitation:* 15 to 20 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.9 inches
*Typical profile:*
A—0 to 8 inches; gravelly loam
Bw1—8 to 13 inches; gravelly loam
Bw2—13 to 19 inches; gravelly loam
Cr—19 to 60 inches; bedrock

### *Additional Components*

*Battlebutte, greater slope and similar soils:* 5 percent
*Rock outcrop, welded tuff:* 5 percent

## 67C—Glaciercreek gravelly ashy silt loam, 0 to 8 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Elevation:* 2,000 to 4,200 feet
*Mean annual precipitation:* 22 to 30 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Glaciercreek and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Outwash plain, stream terrace
*Slope:* 0 to 8 percent
*Elevation:* 2,000 to 4,200 feet
*Effective annual precipitation:* 22 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Volcanic ash over alluvium or outwash
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 3.4 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 15 inches; gravelly ashy silt loam
2C—15 to 60 inches; extremely gravelly loamy sand

### *Additional Components*

*Glaciercreek, greater slope and similar soils:* 5 percent
*Loonlake and similar soils:* 5 percent

## 69B—Meadowpass gravelly loam, 2 to 8 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Elevation:* 3,100 to 4,000 feet
*Mean annual precipitation:* 15 to 19 inches
*Frost-free period:* 80 to 100 days

### *Component Description*

**Meadowpass and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Summit on hill
*Slope:* 2 to 8 percent
*Elevation:* 3,100 to 4,000 feet
*Effective annual precipitation:* 15 to 19 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 3.9 inches
*Typical profile:*
A—0 to 9 inches; gravelly loam
Bt1—9 to 12 inches; gravelly loam
Bt2—12 to 18 inches; sandy clay

Bt/C—18 to 30 inches; sandy clay
Cr—30 to 60 inches; bedrock

### *Additional Components*

*Battlebutte and similar soils:* 9 percent
*Meadowpass, greater slope and similar soils:* 6 percent

## 70D—Half Moon-Lynchlake, dry complex, 4 to 15 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,500 to 4,200 feet
*Mean annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Half Moon and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Collapsed lake plain
*Slope:* 4 to 15 percent
*Elevation:* 3,500 to 4,200 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Glaciolacustrine deposits
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 11.5 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 6 inches; silt loam
E/Bt—6 to 11 inches; silt loam
Bt—11 to 28 inches; silty clay loam
Bk—28 to 43 inches; silt loam
C—43 to 60 inches; silt loam

**Lynchlake, dry and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Collapsed lake plain
*Slope:* 4 to 15 percent
*Elevation:* 3,500 to 4,200 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over glaciolacustrine deposits
*Native plant cover type:* Forestland

*Flooding:* None
*Available water capacity:* Mainly 11.1 inches
*Typical profile:*
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 9 inches; ashy silt loam
Bw—9 to 15 inches; ashy silt loam
2E/Bt—15 to 23 inches; silt loam
2Bt—23 to 41 inches; silty clay loam
2Bk—41 to 60 inches; silt loam

### *Additional Components*

*Tallcreek and similar soils:* 10 percent
*Courville and similar soils:* 5 percent
*Half Moon, cool and similar soils:* 5 percent
*Lynchlake and similar soils:* 5 percent
*Pleasantvalley and similar soils:* 5 percent

## 71C—Kingspoint gravelly silt loam, outwash substratum, 2 to 8 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,000 to 3,400 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Kingspoint, outwash substratum and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Moraine, outwash terrace
*Slope:* 2 to 8 percent
*Elevation:* 3,000 to 3,400 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone over outwash derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.5 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly silt loam
Bw—4 to 16 inches; very gravelly silt loam
Bk—16 to 40 inches; very gravelly silt loam
2C—40 to 60 inches; very gravelly loamy coarse sand

### *Additional Components*

*Kingspoint and similar soils:* 10 percent

## 71D—Kingspoint gravelly silt loam, 4 to 15 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 2,790 to 4,590 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Kingspoint and similar soils**
*Composition:* 95 percent
*Geomorphic description:* Moraine
*Slope:* 4 to 15 percent
*Elevation:* 2,790 to 4,590 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.8 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly silt loam
Bw—4 to 16 inches; very gravelly silt loam
Bk—16 to 60 inches; very gravelly silt loam

### *Additional Components*

*McMannamy and similar soils:* 5 percent

## 71E—Kingspoint gravelly silt loam, 15 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 2,790 to 4,590 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Kingspoint and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Moraine
*Slope:* 15 to 30 percent, north to southwest aspects
*Elevation:* 2,790 to 4,590 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.8 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly silt loam
Bw—4 to 16 inches; very gravelly silt loam
Bk—16 to 60 inches; very gravelly silt loam

### *Additional Components*

*McMannamy and similar soils:* 12 percent
*Rock outcrop:* 1 percent
*Sharrott and similar soils:* 1 percent
*Wimper and similar soils:* 1 percent

## 71F—Kingspoint gravelly silt loam, 30 to 50 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,000 to 4,200 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Kingspoint and similar soils**
*Composition:* 80 percent
*Geomorphic description:* Glaciated mountain slope
*Slope:* 30 to 50 percent, north to south aspects
*Elevation:* 3,000 to 4,200 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None

*Available water capacity:* Mainly 6.8 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly silt loam
Bw—4 to 16 inches; very gravelly silt loam
Bk—16 to 60 inches; very gravelly silt loam

### *Additional Components*

*Repp and similar soils:* 5 percent
*Rock outcrop:* 5 percent
*Sharrott and similar soils:* 5 percent
*Wimper and similar soils:* 3 percent
*McMannamy and similar soils:* 2 percent

## 72A—Blacklake mucky peat, 0 to 1 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,400 to 4,400 feet
*Mean annual precipitation:* 24 to 30 inches
*Frost-free period:* 75 to 95 days

### *Component Description*

**Blacklake and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Closed depression
*Slope:* 0 to 1 percent
*Elevation:* 3,400 to 4,400 feet
*Effective annual precipitation:* 24 to 30 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Organic material over alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Ponding duration:* Very long
*Available water capacity:* Mainly 14.8 inches
*Typical profile:*
Oe—0 to 14 inches; mucky peat
C1—14 to 31 inches; mucky silt loam
C2—31 to 60 inches; stratified very fine sandy loam to silt loam

### *Additional Components*

*McLangor and similar soils:* 10 percent
*Barzee and similar soils:* 3 percent
*Meadowpeak, occasionally flooded and similar soils:* 2 percent

# 74C—Blackcreek-McGregor-Tallcreek complex, 0 to 8 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,400 to 3,600 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Blackcreek and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent
*Elevation:* 3,400 to 3,600 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Forestland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 9.1 inches
*Typical profile:*
A—0 to 4 inches; silt loam
Bw—4 to 10 inches; silt loam
Bk—10 to 36 inches; silt loam
C—36 to 42 inches; silt
2C—42 to 60 inches; stratified loamy coarse sand to silt

**McGregor and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 3,400 to 3,600 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Volcanic ash over alluvium and/or lacustrine deposits
*Native plant cover type:* Rangeland
*Flooding:* Frequent
*Water table:* Present
*Available water capacity:* Mainly 10.1 inches
*Typical profile:*
A—0 to 5 inches; ashy silt loam
E—5 to 14 inches; ashy silt loam
2E—14 to 16 inches; silt loam
2BC—16 to 26 inches; very fine sandy loam
3Cg—26 to 60 inches; silt loam

**Tallcreek and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Stream terrace
*Slope:* 0 to 8 percent
*Elevation:* 3,400 to 3,600 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Moderately well drained
*Parent material:* Volcanic ash over glaciolacustrine deposits
*Native plant cover type:* Forestland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 10.7 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; ashy silt loam
Bw—5 to 19 inches; ashy silt loam
Bk—19 to 29 inches; silt loam
C1—29 to 43 inches; silty clay loam
C2—43 to 60 inches; very fine sandy loam

## 75B—Tallcreek ashy silt loam, 0 to 4 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,300 to 3,800 feet
*Mean annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Tallcreek and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Stream terrace
*Slope:* 0 to 4 percent, west to north aspects
*Elevation:* 3,300 to 3,800 feet
*Effective annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Moderately well drained
*Parent material:* Volcanic ash over glaciolacustrine deposits
*Native plant cover type:* Forestland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 10.7 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; ashy silt loam
Bw—5 to 19 inches; ashy silt loam
Bk—19 to 29 inches; silt loam

C1—29 to 43 inches; silty clay loam
C2—43 to 60 inches; very fine sandy loam

### *Additional Components*

*Blackcreek and similar soils:* 7 percent
*Tallcreek, greater slope and similar soils:* 3 percent

## 80F—Sharrott-Rock outcrop-Winkler complex, 15 to 60 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,600 to 5,400 feet
*Mean annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Sharrott and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Glacially scoured ridge
*Slope:* 15 to 60 percent, southeast to west aspects
*Elevation:* 3,600 to 5,400 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Lithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from quartzite and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 1.6 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; gravelly loam
Bw—5 to 11 inches; very gravelly loam
BC—11 to 13 inches; extremely gravelly loam
R—13 to 60 inches; bedrock

**Rock outcrop**
*Composition:* 25 percent
*Geomorphic description:* None assigned

**Winkler and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 60 percent, southeast to west aspects
*Elevation:* 3,600 to 5,400 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained

*Parent material:* Colluvium derived from quartzite and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 3.4 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; gravelly loam
E—5 to 23 inches; extremely gravelly sandy loam
E and Bt—23 to 60 inches; extremely gravelly sandy loam

### *Additional Components*

*Pleasantvalley and similar soils:* 5 percent
*Rubble land:* 5 percent

## 81D—Foyslake gravelly silt loam, 4 to 15 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,300 to 4,500 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Foyslake and similar soils**
*Composition:* 80 percent
*Geomorphic description:* Moraine
*Slope:* 4 to 15 percent, north to west aspects
*Elevation:* 3,300 to 4,500 feet
*Effective annual precipitation:* 21 to 27 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 12 inches; gravelly silt loam
Bt/E—12 to 21 inches; gravelly silt loam
Bt—21 to 28 inches; very gravelly silty clay loam
Bk—28 to 60 inches; very cobbly silt loam

### *Additional Components*

*Ashleylake and similar soils:* 5 percent
*Kila and similar soils:* 5 percent
*Lesier and similar soils:* 5 percent
*McMannamy and similar soils:* 5 percent

## 81E—Foyslake gravelly silt loam, 15 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,000 to 5,000 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Foyslake and similar soils**
*Composition:* 80 percent
*Geomorphic description:* Moraine
*Slope:* 15 to 30 percent, southwest to south aspects
*Elevation:* 3,000 to 5,000 feet
*Effective annual precipitation:* 21 to 27 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 12 inches; gravelly silt loam
Bt/E—12 to 21 inches; gravelly silt loam
Bt—21 to 28 inches; very gravelly silty clay loam
Bk—28 to 60 inches; very cobbly silt loam

### *Additional Components*

*McMannamy and similar soils:* 10 percent
*Foyslake, greater slope and similar soils:* 5 percent
*Kila and similar soils:* 3 percent
*Blackcreek and similar soils:* 2 percent

## 81F—Foyslake gravelly silt loam, 30 to 50 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,200 to 5,200 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Foyslake and similar soils**
*Composition:* 80 percent
*Geomorphic description:* Glaciated mountain slope

*Slope:* 30 to 50 percent, southwest to south aspects
*Elevation:* 3,200 to 5,200 feet
*Effective annual precipitation:* 21 to 27 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 12 inches; gravelly silt loam
Bt/E—12 to 21 inches; gravelly silt loam
Bt—21 to 28 inches; very gravelly silty clay loam
Bk—28 to 60 inches; very cobbly silt loam

### *Additional Components*

*Foyslake, greater slope and similar soils:* 5 percent
*Kingspoint and similar soils:* 5 percent
*McMannamy and similar soils:* 5 percent
*Rock outcrop:* 5 percent

## 83E—Ashleylake cobbly ashy silt loam, 8 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,200 to 4,800 feet
*Mean annual precipitation:* 22 to 30 inches
*Frost-free period:* 35 to 90 days

### *Component Description*

**Ashleylake and similar soils**
*Composition:* 75 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, northwest to southeast aspects
*Elevation:* 3,200 to 4,800 feet
*Effective annual precipitation:* 22 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from argillite and/or calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 7.4 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 14 inches; cobbly ashy silt loam

E/Bt—14 to 23 inches; very cobbly silt loam
Bt/E—23 to 30 inches; very cobbly silty clay loam
Bt—30 to 40 inches; very cobbly silty clay loam
Bk—40 to 60 inches; very cobbly silt loam

### *Additional Components*

*Ashleylake, greater slope and similar soils:* 5 percent
*Bata and similar soils:* 5 percent
*Bendahl and similar soils:* 5 percent
*Foyslake and similar soils:* 5 percent
*Rock outcrop:* 5 percent

## 83F—Ashleylake-Rock outcrop complex, 30 to 50 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,200 to 4,600 feet
*Mean annual precipitation:* 22 to 30 inches
*Frost-free period:* 35 to 90 days

### *Component Description*

**Ashleylake and similar soils**
*Composition:* 65 percent
*Geomorphic description:* Moraine
*Slope:* 30 to 50 percent, northwest to east aspects
*Elevation:* 3,200 to 4,600 feet
*Effective annual precipitation:* 22 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from argillite and/or calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 7.4 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 14 inches; cobbly ashy silt loam
E/Bt—14 to 23 inches; very cobbly silt loam
Bt/E—23 to 30 inches; very cobbly silty clay loam
Bt—30 to 40 inches; very cobbly silty clay loam
Bk—40 to 60 inches; very cobbly silt loam

**Rock outcrop**
*Composition:* 15 percent
*Geomorphic description:* None assigned

### *Additional Components*

*Ashleylake, greater slope and similar soils:* 5 percent
*Bata and similar soils:* 5 percent

*Bendahl and similar soils:* 5 percent
*Foyslake and similar soils:* 5 percent

## 84E—Lozeau gravelly loam, 8 to 30 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,000 to 4,400 feet
*Mean annual precipitation:* 22 to 25 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Lozeau and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 30 percent
*Elevation:* 3,000 to 4,400 feet
*Effective annual precipitation:* 22 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 4.2 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 4 inches; gravelly loam
E/Bw—4 to 17 inches; gravelly loam
Bt/E—17 to 33 inches; gravelly clay loam
Cr—33 to 60 inches; bedrock

### *Additional Components*

*Lozeau, greater slope and similar soils:* 5 percent
*Pashua and similar soils:* 5 percent
*Rock outcrop, welded tuff:* 5 percent

## 84F—Lozeau gravelly loam, 30 to 50 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,000 to 4,300 feet
*Mean annual precipitation:* 22 to 25 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Lozeau and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Mountain slope
*Slope:* 30 to 50 percent
*Elevation:* 3,000 to 4,300 feet
*Effective annual precipitation:* 22 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 4.2 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 4 inches; gravelly loam
E/Bw—4 to 17 inches; gravelly loam
Bt/E—17 to 33 inches; gravelly clay loam
Cr—33 to 60 inches; bedrock

### *Additional Components*

*Pashua and similar soils:* 5 percent
*Rock outcrop, welded tuff:* 5 percent
*Lozeau, greater slope and similar soils:* 3 percent
*Lozeau, lesser slope and similar soils:* 2 percent

## 85C—Kila ashy silt loam, 0 to 8 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 2,900 to 4,600 feet
*Mean annual precipitation:* 19 to 24 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Kila and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Outwash terrace, stream terrace
*Slope:* 0 to 8 percent, west to south aspects
*Elevation:* 2,900 to 4,600 feet
*Effective annual precipitation:* 21 to 27 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Moderately well drained
*Parent material:* Alluvium and/or outwash over till
*Native plant cover type:* Forestland
*Flooding:* None

*Water table:* Present
*Available water capacity:* Mainly 10.4 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 8 inches; ashy silt loam
Bw—8 to 22 inches; ashy silt loam
Bk—22 to 41 inches; silt loam
2C—41 to 60 inches; very gravelly silt loam

### *Additional Components*

*Idahocreek and similar soils:* 10 percent
*Foyslake and similar soils:* 5 percent

## 86B—Idahocreek silt loam, 0 to 4 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,000 to 4,400 feet
*Mean annual precipitation:* 19 to 24 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Idahocreek and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Outwash terrace, stream terrace
*Slope:* 0 to 4 percent, west to south aspects
*Elevation:* 3,000 to 4,400 feet
*Effective annual precipitation:* 19 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium and/or outwash derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Water table:* Present
*Ponding duration:* Long
*Available water capacity:* Mainly 11.5 inches
*Typical profile:*
A—0 to 6 inches; silt loam
AC—6 to 9 inches; silt
C1—9 to 18 inches; silt
C2—18 to 60 inches; silt

### *Additional Components*

*Half Moon and similar soils:* 5 percent
*Kila and similar soils:* 5 percent

## 87E—Pashua gravelly loam, 8 to 30 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,200 to 3,800 feet
*Mean annual precipitation:* 19 to 23 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Pashua and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 30 percent
*Elevation:* 3,200 to 3,800 feet
*Effective annual precipitation:* 19 to 23 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches
*Typical profile:*
A—0 to 8 inches; gravelly loam
E—8 to 14 inches; gravelly silt loam
Bt/E—14 to 19 inches; gravelly clay
Bt1—19 to 25 inches; clay
Bt2—25 to 37 inches; gravelly clay loam
Cr—37 to 60 inches; bedrock

### *Additional Components*

*Lozeau and similar soils:* 5 percent
*Pashua, greater slope and similar soils:* 5 percent

## 88C—Lesier, dry-Glaciercreek complex, 2 to 8 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,900 to 4,200 feet
*Mean annual precipitation:* 19 to 28 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Lesier and similar soils**
*Composition:* 75 percent
*Geomorphic description:* Outwash terrace
*Slope:* 2 to 8 percent, south to north aspects

*Elevation:* 3,900 to 4,200 feet
*Effective annual precipitation:* 19 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over outwash
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 2 inches; gravelly ashy silt loam
Bw—2 to 11 inches; gravelly ashy silt loam
2E—11 to 18 inches; very gravelly sandy loam
2Bk1—18 to 35 inches; extremely cobbly sandy loam
2Bk2—35 to 60 inches; extremely cobbly sandy loam

**Glaciercreek and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Outwash terrace
*Slope:* 2 to 8 percent, south to north aspects
*Elevation:* 3,900 to 4,200 feet
*Effective annual precipitation:* 19 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Volcanic ash over outwash derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 2.9 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 11 inches; gravelly ashy silt loam
2BC—11 to 18 inches; very cobbly coarse sandy loam
2C—18 to 60 inches; extremely cobbly loamy coarse sand

## 90E—Wimper gravelly silt loam, 15 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,100 to 3,800 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Wimper and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Moraine
*Slope:* 15 to 30 percent, east to north aspects

*Elevation:* 3,100 to 3,800 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
A—0 to 8 inches; gravelly silt loam
Bw—8 to 15 inches; gravelly silt loam
Bk—15 to 60 inches; very gravelly silt loam

### *Additional Components*

*Kingspoint and similar soils:* 10 percent
*Rock outcrop:* 5 percent

## 91B—Biglake gravelly loam, 0 to 8 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 2,500 to 4,500 feet
*Mean annual precipitation:* 14 to 19 inches
*Frost-free period:* 80 to 100 days

### *Component Description*

**Biglake and similar soils**
*Composition:* 90 percent
*Geomorphic description:* Alluvial fan, drainageway, stream terrace
*Slope:* 0 to 8 percent, south to southwest aspects
*Elevation:* 2,500 to 4,500 feet
*Effective annual precipitation:* 14 to 19 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 3.2 inches
*Typical profile:*
A—0 to 9 inches; gravelly loam
Bw—9 to 20 inches; very cobbly sandy loam
C—20 to 60 inches; extremely gravelly loamy sand

### *Additional Components*

*Biglake, greater slope and similar soils:* 4 percent
*Biglake, very cobbly and similar soils:* 4 percent
*Bowlake and similar soils:* 2 percent

## 92F—Bata gravelly ashy silt loam, 15 to 50 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,800 to 5,400 feet
*Mean annual precipitation:* 30 to 40 inches
*Frost-free period:* 35 to 90 days

### *Component Description*

**Bata and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Moraine
*Slope:* 15 to 50 percent, north to northeast aspects
*Elevation:* 3,800 to 5,400 feet
*Effective annual precipitation:* 30 to 40 inches
*Frost-free period:* 35 to 65 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.5 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 3 inches; gravelly ashy silt loam
Bw—3 to 11 inches; gravelly ashy silt loam
2Bt/E—11 to 29 inches; very gravelly silt loam
2Bt—29 to 41 inches; very gravelly silty clay loam
2Bk—41 to 60 inches; very cobbly silt loam

### *Additional Components*

*Ashleylake and similar soils:* 5 percent
*Foyslake and similar soils:* 5 percent
*Rock outcrop:* 5 percent

## 95D—Wimper cobbly silt loam, 4 to 15 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,100 to 3,500 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Wimper and similar soils**
*Composition:* 80 percent
*Geomorphic description:* Moraine

*Slope:* 4 to 15 percent
*Elevation:* 3,100 to 3,500 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Cobbly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
A—0 to 8 inches; cobbly silt loam
Bw—8 to 15 inches; gravelly silt loam
Bk—15 to 60 inches; very gravelly silt loam

### *Additional Components*

*Kila and similar soils:* 8 percent
*Wimper, greater slope and similar soils:* 7 percent
*Kingspoint and similar soils:* 5 percent

## 99A—McLangor-Meadowpeak complex, 0 to 2 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,200 to 3,800 feet
*Mean annual precipitation:* 24 to 30 inches
*Frost-free period:* 75 to 95 days

### *Component Description*

**McLangor and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 3,200 to 3,800 feet
*Effective annual precipitation:* 24 to 30 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Organic material over alluvium
*Native plant cover type:* Rangeland
*Flooding:* Frequent
*Water table:* Present
*Available water capacity:* Mainly 17.6 inches
*Typical profile:*
Oe1—0 to 8 inches; mucky peat
Oe2—8 to 17 inches; mucky peat
C1—17 to 36 inches; stratified very fine sandy loam to silt
C2—36 to 42 inches; stratified mucky peat to silt loam

Oa—42 to 54 inches; muck
Cg—54 to 60 inches; stratified very fine sandy loam to silt

**Meadowpeak and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 3,200 to 3,800 feet
*Effective annual precipitation:* 24 to 30 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Frequent
*Water table:* Present
*Available water capacity:* Mainly 10.1 inches
*Typical profile:*
A—0 to 4 inches; silt loam
C1—4 to 25 inches; silt loam
C2—25 to 34 inches; stratified loam to silt loam
C3—34 to 60 inches; stratified very fine sandy loam to silt

### *Additional Components*

*Water:* 5 percent

## 122E—Winkler, cool-Rock outcrop-Sharrott, cool complex, 8 to 40 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,000 to 5,600 feet
*Mean annual precipitation:* 17 to 30 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Winkler and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 40 percent
*Elevation:* 3,000 to 5,600 feet
*Effective annual precipitation:* 17 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Colluvium derived from quartzite and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 4.1 inches

*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 10 inches; gravelly sandy loam
E—10 to 36 inches; extremely gravelly sandy loam
E/Bw—36 to 60 inches; extremely gravelly sandy loam

**Rock outcrop**
*Composition:* 25 percent
*Geomorphic description:* None assigned

**Sharrott and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 40 percent
*Elevation:* 3,000 to 5,600 feet
*Effective annual precipitation:* 17 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Lithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from quartzite and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 1.5 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 3 inches; gravelly loam
Bw—3 to 7 inches; very gravelly loam
BC—7 to 16 inches; extremely gravelly loam
R—16 to 60 inches; bedrock

### *Additional Components*

*Rubble land:* 5 percent
*Winkler, greater slope and similar soils:* 5 percent

## 138E—Winfall-Courville complex, dry, 8 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,600 to 5,400 feet
*Mean annual precipitation:* 24 to 32 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Winfall and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, east to north aspects
*Elevation:* 3,600 to 5,400 feet
*Effective annual precipitation:* 24 to 32 inches

*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till and/or drift derived from argillite and/or quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.0 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 9 inches; gravelly loam
E and Bt—9 to 60 inches; very gravelly loam

**Courville and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, east to north aspects
*Elevation:* 3,600 to 5,400 feet
*Effective annual precipitation:* 24 to 32 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till and/or drift
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.2 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 10 inches; gravelly ashy silt loam
2E—10 to 22 inches; very cobbly fine sandy loam
2E/Bw—22 to 60 inches; very cobbly fine sandy loam

### *Additional Components*

*Tevis and similar soils:* 6 percent
*Winfall, greater slope and similar soils:* 5 percent
*Rock outcrop:* 4 percent

## 150E—Bigarm-Hogsby-Rock outcrop complex, 8 to 30 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Elevation:* 2,600 to 5,500 feet
*Mean annual precipitation:* 14 to 19 inches
*Frost-free period:* 80 to 100 days

### *Component Description*

**Bigarm and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Hill
*Slope:* 8 to 30 percent
*Elevation:* 2,600 to 5,500 feet

*Effective annual precipitation:* 14 to 19 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Colluvium derived from argillite and quartzite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches
*Typical profile:*
A—0 to 11 inches; gravelly loam
Bw—11 to 26 inches; very gravelly loam
C—26 to 60 inches; extremely gravelly loamy sand

**Hogsby and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Hill
*Slope:* 8 to 30 percent
*Elevation:* 2,600 to 5,500 feet
*Effective annual precipitation:* 14 to 19 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* Lithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from argillite and/or quartzite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.8 inches
*Typical profile:*
A—0 to 9 inches; cobbly loam
Bw—9 to 12 inches; very cobbly loam
C—12 to 17 inches; extremely channery loam
R—17 to 60 inches; bedrock

**Rock outcrop**
*Composition:* 20 percent
*Geomorphic description:* None assigned

### *Additional Components*

*Bigarm, greater slope and similar soils:* 5 percent
*Rubble land:* 5 percent

## 150F—Bigarm-Hogsby-Rock outcrop complex, 30 to 60 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 2,600 to 5,500 feet
*Mean annual precipitation:* 14 to 19 inches
*Frost-free period:* 70 to 100 days

### *Component Description*

**Bigarm and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Hill
*Slope:* 30 to 60 percent
*Elevation:* 2,600 to 5,500 feet
*Effective annual precipitation:* 14 to 19 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Colluvium derived from argillite and quartzite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 3.9 inches
*Typical profile:*
A1—0 to 5 inches; cobbly loam
A2—5 to 17 inches; very cobbly loam
Bw—17 to 38 inches; very cobbly sandy loam
C—38 to 60 inches; very cobbly loamy sand

**Hogsby and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Hill
*Slope:* 30 to 60 percent
*Elevation:* 2,600 to 5,500 feet
*Effective annual precipitation:* 14 to 19 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Cobbly loam
*Depth to restrictive feature:* Lithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from argillite and/or quartzite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.8 inches
*Typical profile:*
A—0 to 9 inches; cobbly loam
Bw—9 to 12 inches; very cobbly loam
C—12 to 17 inches; extremely channery loam
R—17 to 60 inches; bedrock

**Rock outcrop**
*Composition:* 20 percent
*Geomorphic description:* None assigned

### *Additional Components*

*Bigarm, greater slope and similar soils:* 5 percent
*Finleypoint and similar soils:* 5 percent
*Rubble land:* 5 percent

# 166E—Battlebutte-Bigdraw-Rock outcrop, welded tuff complex, 15 to 30 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Elevation:* 2,900 to 3,900 feet
*Mean annual precipitation:* 15 to 20 inches
*Frost-free period:* 80 to 100 days

### *Component Description*

**Battlebutte and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Hill
*Slope:* 15 to 30 percent
*Elevation:* 2,900 to 3,900 feet
*Effective annual precipitation:* 15 to 20 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.9 inches
*Typical profile:*
A—0 to 8 inches; gravelly loam
Bw1—8 to 13 inches; gravelly loam
Bw2—13 to 19 inches; gravelly loam
Cr—19 to 60 inches; bedrock

**Bigdraw and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Hill
*Slope:* 15 to 30 percent
*Elevation:* 2,900 to 3,900 feet
*Effective annual precipitation:* 15 to 20 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 3.2 inches
*Typical profile:*
A—0 to 9 inches; gravelly loam
Bt1—9 to 15 inches; gravelly clay loam
Bt2—15 to 20 inches; gravelly loam
Bk—20 to 28 inches; very paragravelly coarse sandy loam
Cr—28 to 60 inches; bedrock

**Rock outcrop, welded tuff**
*Composition:* 20 percent
*Geomorphic description:* None assigned

### *Additional Components*

*Battlebutte, greater slope and similar soils:* 5 percent
*Bigarm and similar soils:* 5 percent

## 166F—Battlebutte-Rock outcrop, welded tuff complex, 30 to 60 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 2,900 to 3,700 feet
*Mean annual precipitation:* 15 to 20 inches
*Frost-free period:* 85 to 110 days

### *Component Description*

**Battlebutte and similar soils**
*Composition:* 65 percent
*Geomorphic description:* Hill
*Slope:* 30 to 60 percent
*Elevation:* 2,900 to 3,700 feet
*Effective annual precipitation:* 15 to 20 inches
*Frost-free period:* 85 to 110 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Residuum weathered from welded tuff
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.9 inches
*Typical profile:*
A—0 to 8 inches; gravelly loam
Bw1—8 to 13 inches; gravelly loam
Bw2—13 to 19 inches; gravelly loam
Cr—19 to 60 inches; bedrock

**Rock outcrop, welded tuff**
*Composition:* 25 percent
*Geomorphic description:* None assigned

### *Additional Components*

*Battlebutte, greater slope and similar soils:* 5 percent
*Bigdraw and similar soils:* 5 percent

## 168D—Bigdraw-Battlebutte gravelly loams, 4 to 15 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Elevation:* 2,900 to 3,700 feet
*Mean annual precipitation:* 15 to 20 inches
*Frost-free period:* 80 to 100 days

### *Component Description*

**Bigdraw and similar soils**
*Composition:* 60 percent
*Geomorphic description:* Hill
*Slope:* 4 to 15 percent
*Elevation:* 2,900 to 3,700 feet
*Effective annual precipitation:* 15 to 20 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 3.2 inches
*Typical profile:*
A—0 to 9 inches; gravelly loam
Bt1—9 to 15 inches; gravelly clay loam
Bt2—15 to 20 inches; gravelly loam
Bk—20 to 28 inches; very paragravelly coarse sandy loam
Cr—28 to 60 inches; bedrock

**Battlebutte and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Hill
*Slope:* 4 to 15 percent
*Elevation:* 2,900 to 3,700 feet
*Effective annual precipitation:* 15 to 20 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.9 inches
*Typical profile:*
A—0 to 8 inches; gravelly loam
Bw1—8 to 13 inches; gravelly loam
Bw2—13 to 19 inches; gravelly loam
Cr—19 to 60 inches; bedrock

### *Additional Components*

*Bigdraw, greater slope and similar soils:* 5 percent
*Rock outcrop, welded tuff:* 5 percent

## 201E—Winkler-Combest complex, 8 to 35 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,400 to 4,600 feet

*Mean annual precipitation:* 17 to 30 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Winkler and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Mountain slope
*Slope:* 15 to 35 percent, east to west aspects
*Elevation:* 3,400 to 4,600 feet
*Effective annual precipitation:* 16 to 25 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Colluvium derived from quartzite and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 3.4 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; gravelly loam
E—5 to 23 inches; extremely gravelly sandy loam
E and Bt—23 to 60 inches; extremely gravelly sandy loam

**Combest and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 35 percent, east to west aspects
*Elevation:* 3,400 to 4,600 feet
*Effective annual precipitation:* 16 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
Bw—2 to 12 inches; gravelly ashy silt loam
2E—12 to 26 inches; very gravelly sandy loam
2E/Bw—26 to 60 inches; extremely cobbly coarse sandy loam

### *Additional Components*

*Winkler, greater slope and similar soils:* 10 percent
*Sharrott and similar soils:* 3 percent
*Rock outcrop:* 2 percent

# 201F—Winkler-Combest complex, 35 to 60 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,600 to 5,000 feet
*Mean annual precipitation:* 17 to 30 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Winkler and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent, northeast to west aspects
*Elevation:* 3,600 to 5,000 feet
*Effective annual precipitation:* 16 to 25 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Colluvium derived from quartzite and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 3.4 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; gravelly loam
E—5 to 23 inches; extremely gravelly sandy loam
E and Bt—23 to 60 inches; extremely gravelly sandy loam

**Combest and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain slope
*Slope:* 35 to 60 percent, northeast to west aspects
*Elevation:* 3,600 to 5,000 feet
*Effective annual precipitation:* 16 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
Bw—2 to 12 inches; gravelly ashy silt loam
2E—12 to 26 inches; very gravelly sandy loam
2E/Bw—26 to 60 inches; extremely cobbly coarse sandy loam

### *Additional Components*

*Combest, lesser slope and similar soils:* 10 percent
*Rock outcrop:* 5 percent

*Rubble land:* 5 percent
*Sharrott and similar soils:* 5 percent
*Winkler, lesser slope and similar soils:* 5 percent

## 211G—Combest-Sharrott-Rock outcrop complex, 40 to 85 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,500 to 4,900 feet
*Mean annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Combest and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 40 to 70 percent, east to northwest aspects
*Elevation:* 3,500 to 4,900 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
Bw—2 to 12 inches; gravelly ashy silt loam
2E—12 to 26 inches; very gravelly sandy loam
2E/Bw—26 to 60 inches; extremely cobbly coarse sandy loam

**Sharrott and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 40 to 85 percent, east to northwest aspects
*Elevation:* 3,500 to 4,900 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Lithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from quartzite and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 1.6 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; gravelly loam

Bw—5 to 11 inches; very gravelly loam
BC—11 to 13 inches; extremely gravelly loam
R—13 to 60 inches; bedrock

**Rock outcrop**
*Composition:* 25 percent
*Geomorphic description:* None assigned

### *Additional Components*

*Rubble land:* 10 percent
*Winkler and similar soils:* 5 percent

## 221F—Courville-Rockhill-Rock outcrop complex, 30 to 50 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,000 to 6,000 feet
*Mean annual precipitation:* 25 to 45 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Courville and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Moraine, mountain slope
*Slope:* 30 to 50 percent, east to east aspects
*Elevation:* 3,000 to 6,000 feet
*Effective annual precipitation:* 25 to 45 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over drift and/or till
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.5 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
Bw—2 to 10 inches; gravelly ashy silt loam
2E—10 to 41 inches; very gravelly loam
2E/Bw—41 to 60 inches; very gravelly loam

**Rockhill and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Mountain slope
*Slope:* 30 to 50 percent, east to east aspects
*Elevation:* 3,000 to 6,000 feet
*Effective annual precipitation:* 25 to 45 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly ashy silt loam
*Depth to restrictive feature:* Lithic bedrock: 10 to 20 inches
*Drainage class:* Well drained

*Parent material:* Volcanic ash over colluvium
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 2.0 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; very gravelly ashy silt loam
Bw—5 to 14 inches; very gravelly ashy silt loam
2C—14 to 19 inches; extremely gravelly silt loam
R—19 to 60 inches; bedrock

**Rock outcrop**
*Composition:* 15 percent
*Geomorphic description:* None assigned

### *Additional Components*

*Mitten and similar soils:* 10 percent
*Rubble land:* 5 percent

## 222C—Pleasantvalley-Winfall, dry complex, 2 to 8 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,500 to 4,260 feet
*Mean annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Pleasantvalley and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Moraine
*Slope:* 2 to 8 percent, east to north aspects
*Elevation:* 3,500 to 4,270 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly ashy silt loam
Bw—4 to 14 inches; gravelly ashy silt loam
2E—14 to 26 inches; very cobbly silt loam
2E/Bw—26 to 34 inches; very cobbly silt loam
2E/Bt—34 to 60 inches; very cobbly silt loam

**Winfall and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Moraine
*Slope:* 2 to 8 percent, east to north aspects
*Elevation:* 3,500 to 4,270 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.0 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 9 inches; gravelly loam
E and Bt—9 to 60 inches; very gravelly loam

### *Additional Components*

*Courville and similar soils:* 10 percent
*Glaciercreek and similar soils:* 5 percent
*Lynchlake, dry and similar soils:* 5 percent
*Meadowpeak and similar soils:* 5 percent
*Tallcreek and similar soils:* 5 percent

## 222E—Pleasantvalley-Winfall, dry complex, 8 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,520 to 4,800 feet
*Mean annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Pleasantvalley and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, east to northwest aspects
*Elevation:* 3,520 to 4,800 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches

*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly ashy silt loam
Bw—4 to 14 inches; gravelly ashy silt loam
2E—14 to 26 inches; very cobbly silt loam
2E/Bw—26 to 34 inches; very cobbly silt loam
2E/Bt—34 to 60 inches; very cobbly silt loam

**Winfall and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, east to northwest aspects
*Elevation:* 3,520 to 4,800 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.0 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 9 inches; gravelly loam
E and Bt—9 to 60 inches; very gravelly loam

### *Additional Components*

*Courville, dry and similar soils:* 10 percent
*Courville and similar soils:* 5 percent
*Glaciercreek and similar soils:* 5 percent
*Rock outcrop:* 5 percent
*Combest and similar soils:* 3 percent
*Sharrott and similar soils:* 2 percent

## 223E—Pleasantvalley-Winfall, dry-Rock outcrop complex, 8 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,550 to 4,520 feet
*Mean annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Pleasantvalley and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, east to west aspects
*Elevation:* 3,550 to 4,520 feet
*Effective annual precipitation:* 22 to 28 inches

*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly ashy silt loam
Bw—4 to 14 inches; gravelly ashy silt loam
2E—14 to 26 inches; very cobbly silt loam
2E/Bw—26 to 34 inches; very cobbly silt loam
2E/Bt—34 to 60 inches; very cobbly silt loam

**Winfall and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, east to west aspects
*Elevation:* 3,550 to 4,520 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.0 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 9 inches; gravelly loam
E and Bt—9 to 60 inches; very gravelly loam

**Rock outcrop**
*Composition:* 15 percent
*Definition:* Areas of exposed argillite and quartzite bedrock
*Geomorphic description:* None assigned

### *Additional Components*

*Courville and similar soils:* 10 percent
*Rockhill and similar soils:* 10 percent
*Stevie and similar soils:* 5 percent

## 223F—Pleasantvalley-Winfall, dry-Rock outcrop complex, 30 to 50 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,530 to 5,000 feet

*Mean annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Pleasantvalley and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Moraine
*Slope:* 30 to 50 percent, east to west aspects
*Elevation:* 3,530 to 5,000 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly ashy silt loam
Bw—4 to 14 inches; gravelly ashy silt loam
2E—14 to 26 inches; very cobbly silt loam
2E/Bw—26 to 34 inches; very cobbly silt loam
2E/Bt—34 to 60 inches; very cobbly silt loam

**Winfall and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Moraine
*Slope:* 30 to 50 percent, east to west aspects
*Elevation:* 3,530 to 5,000 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.0 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 9 inches; gravelly loam
E and Bt—9 to 60 inches; very gravelly loam

**Rock outcrop**
*Composition:* 20 percent
*Definition:* Areas of exposed argillite and quartzite bedrock
*Geomorphic description:* None assigned

### *Additional Components*

*Courville and similar soils:* 10 percent
*Rockhill and similar soils:* 10 percent

# 224C—Pleasantvalley-Finleypoint-Lynchlake, dry complex, 2 to 8 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,500 to 3,700 feet
*Mean annual precipitation:* 23 to 27 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Pleasantvalley and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Moraine
*Slope:* 2 to 8 percent, west to southeast aspects
*Elevation:* 3,500 to 3,700 feet
*Effective annual precipitation:* 23 to 27 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly ashy silt loam
Bw—4 to 14 inches; gravelly ashy silt loam
2E—14 to 26 inches; very cobbly silt loam
2E/Bw—26 to 34 inches; very cobbly silt loam
2E/Bt—34 to 60 inches; very cobbly silt loam

**Finleypoint and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Moraine
*Slope:* 2 to 8 percent, south to southwest aspects
*Elevation:* 3,500 to 3,700 feet
*Effective annual precipitation:* 20 to 24 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Cobbly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 7.7 inches
*Typical profile:*
A—0 to 10 inches; cobbly silt loam
E—10 to 20 inches; cobbly silt loam
E/Bw1—20 to 28 inches; very cobbly silt loam
E/Bw2—28 to 60 inches; very cobbly silt loam

**Lynchlake, dry and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Moraine
*Slope:* 2 to 8 percent, west to southeast aspects
*Elevation:* 3,500 to 3,700 feet
*Effective annual precipitation:* 23 to 27 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over glaciolacustrine deposits and/or till
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 11.1 inches
*Typical profile:*
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 9 inches; ashy silt loam
Bw—9 to 15 inches; ashy silt loam
2E/Bt—15 to 23 inches; silt loam
2Bt—23 to 41 inches; silty clay loam
2Bk—41 to 60 inches; silt loam

**Meadowpeak and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent, west to southeast aspects
*Elevation:* 3,500 to 3,700 feet
*Effective annual precipitation:* 23 to 27 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Occasional
*Water table:* Present
*Available water capacity:* Mainly 10.1 inches
*Typical profile:*
A—0 to 4 inches; silt loam
C1—4 to 25 inches; silt loam
C2—25 to 34 inches; stratified loam to silt loam
C3—34 to 60 inches; stratified very fine sandy loam to silt

### *Additional Components*

*Courville and similar soils:* 5 percent
*McGregor and similar soils:* 5 percent
*Tallcreek and similar soils:* 5 percent

# 224E—Pleasantvalley-Lynchlake, dry-Finleypoint complex, 8 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,500 to 4,100 feet
*Mean annual precipitation:* 18 to 26 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Pleasantvalley and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, west to east aspects
*Elevation:* 3,500 to 4,100 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly ashy silt loam
Bw—4 to 14 inches; gravelly ashy silt loam
2E—14 to 26 inches; very cobbly silt loam
2E/Bw—26 to 34 inches; very cobbly silt loam
2E/Bt—34 to 60 inches; very cobbly silt loam

**Lynchlake, dry and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 15 percent, west to east aspects
*Elevation:* 3,500 to 4,100 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over glaciolacustrine deposits and/or till
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 11.1 inches
*Typical profile:*
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 9 inches; ashy silt loam
Bw—9 to 15 inches; ashy silt loam
2E/Bt—15 to 23 inches; silt loam

2Bt—23 to 41 inches; silty clay loam
2Bk—41 to 60 inches; silt loam

**Finleypoint and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 20 percent, south to southwest aspects
*Elevation:* 3,500 to 4,100 feet
*Effective annual precipitation:* 17 to 24 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Cobbly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 7.7 inches
*Typical profile:*
A—0 to 10 inches; cobbly silt loam
E—10 to 20 inches; cobbly silt loam
E/Bw1—20 to 28 inches; very cobbly silt loam
E/Bw2—28 to 60 inches; very cobbly silt loam

### *Additional Components*

*Meadowpeak and similar soils:* 10 percent
*Winfall and similar soils:* 10 percent
*Courville and similar soils:* 5 percent

## 225F—Pleasantvalley-Courville-Glaciercreek complex, 30 to 50 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,500 to 5,000 feet
*Mean annual precipitation:* 22 to 28 inches
*Frost-free period:* 40 to 90 days

### *Component Description*

**Pleasantvalley and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Moraine, mountain slope
*Slope:* 30 to 50 percent, east to southwest aspects
*Elevation:* 3,500 to 5,000 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None

*Available water capacity:* Mainly 6.3 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly ashy silt loam
Bw—4 to 14 inches; gravelly ashy silt loam
2E—14 to 26 inches; very cobbly silt loam
2E/Bw—26 to 34 inches; very cobbly silt loam
2E/Bt—34 to 60 inches; very cobbly silt loam

**Courville and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Moraine, mountain slope
*Slope:* 30 to 50 percent, west to north aspects
*Elevation:* 3,500 to 5,000 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.2 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 10 inches; gravelly ashy silt loam
2E—10 to 22 inches; very cobbly fine sandy loam
2E/Bw—22 to 60 inches; very cobbly fine sandy loam

**Glaciercreek and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Moraine, mountain slope
*Slope:* 30 to 50 percent, west to north aspects
*Elevation:* 3,500 to 5,000 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 2.9 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 11 inches; gravelly ashy silt loam
2BC—11 to 18 inches; very cobbly coarse sandy loam
2C—18 to 60 inches; extremely cobbly loamy coarse sand

### *Additional Components*

*Blackcreek and similar soils:* 5 percent
*Rock outcrop:* 5 percent
*Stevie and similar soils:* 5 percent
*Waldbillig and similar soils:* 5 percent
*Winfall and similar soils:* 5 percent

# 266E—Battlebutte-Bigdraw gravelly loams, 15 to 30 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Elevation:* 2,900 to 3,900 feet
*Mean annual precipitation:* 15 to 20 inches
*Frost-free period:* 80 to 100 days

### *Component Description*

**Battlebutte and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Hill
*Slope:* 15 to 30 percent
*Elevation:* 2,900 to 3,900 feet
*Effective annual precipitation:* 15 to 20 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 1.9 inches
*Typical profile:*
A—0 to 8 inches; gravelly loam
Bw1—8 to 13 inches; gravelly loam
Bw2—13 to 19 inches; gravelly loam
Cr—19 to 60 inches; bedrock

**Bigdraw and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Hill
*Slope:* 15 to 30 percent
*Elevation:* 2,900 to 3,900 feet
*Effective annual precipitation:* 15 to 20 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 3.2 inches
*Typical profile:*
A—0 to 9 inches; gravelly loam
Bt1—9 to 15 inches; gravelly clay loam
Bt2—15 to 20 inches; gravelly loam
Bk—20 to 28 inches; very paragravelly coarse sandy loam
Cr—28 to 60 inches; bedrock

### *Additional Components*

*Battlebutte, greater slope and similar soils:* 5 percent
*Rock outcrop, welded tuff:* 5 percent

# 273E—Wildgen-Finleypoint-Combest complex, 8 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,550 to 4,000 feet
*Mean annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Wildgen and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, east to west aspects
*Elevation:* 3,550 to 4,000 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.7 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
A—2 to 7 inches; gravelly loam
E—7 to 18 inches; very gravelly loam
E and Bt—18 to 60 inches; very gravelly sandy loam

**Finleypoint and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, east to west aspects
*Elevation:* 3,550 to 4,000 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Cobbly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 7.7 inches
*Typical profile:*
A—0 to 10 inches; cobbly silt loam
E—10 to 20 inches; cobbly silt loam
E/Bw1—20 to 28 inches; very cobbly silt loam
E/Bw2—28 to 60 inches; very cobbly silt loam

**Combest and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 30 percent, east to west aspects
*Elevation:* 3,550 to 4,000 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.0 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
Bw—2 to 12 inches; gravelly ashy silt loam
2E—12 to 26 inches; very gravelly sandy loam
2E/Bw—26 to 60 inches; extremely cobbly coarse sandy loam

### *Additional Components*

*Sharrott and similar soils:* 10 percent
*Wimper and similar soils:* 10 percent
*Rock outcrop:* 5 percent

## 292B—McCollum fine sandy loam, 0 to 4 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 2,400 to 3,300 feet
*Mean annual precipitation:* 14 to 18 inches
*Frost-free period:* 75 to 100 days

### *Component Description*

**McCollum and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Stream terrace
*Slope:* 0 to 4 percent, east to west aspects
*Elevation:* 2,400 to 3,300 feet
*Effective annual precipitation:* 14 to 18 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 8.0 inches
*Typical profile:*
Ap—0 to 10 inches; fine sandy loam
Bw—10 to 21 inches; fine sandy loam
C—21 to 60 inches; fine sandy loam

### *Additional Components*

*Grantsdale and similar soils:* 8 percent
*McCollum, greater slope and similar soils:* 3 percent
*Sacheen and similar soils:* 3 percent
*Horseplains and similar soils:* 1 percent

## 331G—Mitten, dry-Rock outcrop-Rockhill complex, 40 to 70 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,200 to 5,000 feet
*Mean annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Mitten and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 40 to 70 percent, west to east aspects
*Elevation:* 3,200 to 5,000 feet
*Effective annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.7 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 10 inches; gravelly ashy silt loam
2E—10 to 14 inches; very gravelly loam
2E/Bw—14 to 30 inches; very gravelly very fine sandy loam
2BC—30 to 60 inches; extremely gravelly fine sandy loam

**Rock outcrop**
*Composition:* 25 percent
*Geomorphic description:* None assigned

**Rockhill and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Mountain slope
*Slope:* 40 to 70 percent, west to east aspects
*Elevation:* 3,200 to 5,000 feet
*Effective annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly ashy silt loam
*Depth to restrictive feature:* Lithic bedrock: 10 to 20 inches
*Drainage class:* Well drained

*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 2.0 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; very gravelly ashy silt loam
Bw—5 to 14 inches; very gravelly ashy silt loam
2C—14 to 19 inches; extremely gravelly silt loam
R—19 to 60 inches; bedrock

### *Additional Components*

*Rubble land:* 10 percent
*Combest and similar soils:* 5 percent
*Pleasantvalley and similar soils:* 5 percent
*Tevis and similar soils:* 5 percent

## 366E—Battlebutte-Bigdraw gravelly loams, moist, 8 to 30 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Elevation:* 2,900 to 4,200 feet
*Mean annual precipitation:* 15 to 20 inches
*Frost-free period:* 75 to 95 days

### *Component Description*

**Battlebutte and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Hill
*Slope:* 8 to 30 percent
*Elevation:* 2,900 to 4,200 feet
*Effective annual precipitation:* 15 to 20 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 1.9 inches
*Typical profile:*
A—0 to 8 inches; gravelly loam
Bw1—8 to 13 inches; gravelly loam
Bw2—13 to 19 inches; gravelly loam
Cr—19 to 60 inches; bedrock

**Bigdraw and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Hill
*Slope:* 8 to 30 percent
*Elevation:* 2,900 to 4,200 feet
*Effective annual precipitation:* 15 to 20 inches

*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 3.2 inches
*Typical profile:*
A—0 to 9 inches; gravelly loam
Bt1—9 to 15 inches; gravelly clay loam
Bt2—15 to 20 inches; gravelly loam
Bk—20 to 28 inches; very paragravelly coarse sandy loam
Cr—28 to 60 inches; bedrock

### *Additional Components*

*Battlebutte, greater slope and similar soils:* 5 percent
*Rock outcrop, welded tuff:* 5 percent

## 366F—Battlebutte-Bigdraw gravelly loams, moist, 30 to 60 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Elevation:* 2,900 to 4,400 feet
*Mean annual precipitation:* 15 to 20 inches
*Frost-free period:* 75 to 95 days

### *Component Description*

**Battlebutte and similar soils**
*Composition:* 60 percent
*Geomorphic description:* Hill
*Slope:* 30 to 60 percent
*Elevation:* 2,900 to 4,400 feet
*Effective annual precipitation:* 15 to 20 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 1.9 inches
*Typical profile:*
A—0 to 8 inches; gravelly loam
Bw1—8 to 13 inches; gravelly loam
Bw2—13 to 19 inches; gravelly loam
Cr—19 to 60 inches; bedrock

**Bigdraw and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Hill
*Slope:* 30 to 50 percent

*Elevation:* 2,900 to 4,400 feet
*Effective annual precipitation:* 15 to 20 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 3.2 inches
*Typical profile:*
A—0 to 9 inches; gravelly loam
Bt1—9 to 15 inches; gravelly clay loam
Bt2—15 to 20 inches; gravelly loam
Bk—20 to 28 inches; very paragravelly coarse sandy loam
Cr—28 to 60 inches; bedrock

### *Additional Components*

*Battlebutte, greater slope and similar soils:* 5 percent
*Rock outcrop, welded tuff:* 5 percent

## 491C—Wimper-Finleypoint-Haskillpass complex, 2 to 8 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,500 to 3,600 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 100 days

### *Component Description*

**Wimper and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Moraine
*Slope:* 2 to 8 percent, east to west aspects
*Elevation:* 3,500 to 3,600 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
A—0 to 8 inches; gravelly silt loam
Bw—8 to 15 inches; gravelly silt loam
Bk—15 to 60 inches; very gravelly silt loam

**Finleypoint and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Moraine
*Slope:* 2 to 8 percent, east to west aspects
*Elevation:* 3,500 to 3,600 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Cobbly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 7.7 inches
*Typical profile:*
A—0 to 10 inches; cobbly silt loam
E—10 to 20 inches; cobbly silt loam
E/Bw1—20 to 28 inches; very cobbly silt loam
E/Bw2—28 to 60 inches; very cobbly silt loam

**Haskillpass and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Moraine
*Slope:* 2 to 8 percent, east to west aspects
*Elevation:* 3,500 to 3,600 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 6.8 inches
*Typical profile:*
A—0 to 12 inches; ashy silt loam
Bw—12 to 18 inches; cobbly silt loam
2E—18 to 29 inches; very cobbly silt loam
2Bt—29 to 43 inches; very cobbly silt loam
2Bk—43 to 60 inches; very cobbly silt loam

### *Additional Components*

*Lostprairie and similar soils:* 10 percent
*Dahlake and similar soils:* 5 percent
*Meadowpeak and similar soils:* 5 percent

## 491E—Wimper-Finleypoint-Haskillpass complex, 8 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin

*Elevation:* 3,500 to 3,600 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 100 days

### *Component Description*

**Wimper and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, east to northwest aspects
*Elevation:* 3,500 to 3,600 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
A—0 to 8 inches; gravelly silt loam
Bw—8 to 15 inches; gravelly silt loam
Bk—15 to 60 inches; very gravelly silt loam

**Finleypoint and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, east to northwest aspects
*Elevation:* 3,500 to 3,600 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Cobbly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 7.7 inches
*Typical profile:*
A—0 to 10 inches; cobbly silt loam
E—10 to 20 inches; cobbly silt loam
E/Bw1—20 to 28 inches; very cobbly silt loam
E/Bw2—28 to 60 inches; very cobbly silt loam

**Haskillpass and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 15 percent, east to northwest aspects
*Elevation:* 3,500 to 3,600 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Rangeland

*Flooding:* None
*Available water capacity:* Mainly 6.8 inches
*Typical profile:*
A—0 to 12 inches; ashy silt loam
Bw—12 to 18 inches; cobbly silt loam
2E—18 to 29 inches; very cobbly silt loam
2Bt—29 to 43 inches; very cobbly silt loam
2Bk—43 to 60 inches; very cobbly silt loam

### *Additional Components*

*Meadowpeak and similar soils:* 8 percent
*Lostprairie and similar soils:* 7 percent

## 512D—Perma-Quast-Totelake complex, 4 to 15 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,450 to 3,600 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 100 days

### *Component Description*

**Perma and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Esker, outwash terrace
*Slope:* 4 to 15 percent, south to north aspects
*Elevation:* 3,450 to 3,600 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Outwash derived from quartzite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches
*Typical profile:*
A—0 to 12 inches; gravelly loam
Bw—12 to 36 inches; very gravelly sandy loam
BC—36 to 60 inches; extremely gravelly sandy loam

**Quast and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Esker, outwash terrace
*Slope:* 4 to 15 percent, south to north aspects
*Elevation:* 3,450 to 3,600 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Very fine sandy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained

*Parent material:* Outwash derived from quartzite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 9.5 inches
*Typical profile:*
A—0 to 15 inches; very fine sandy loam
Bw1—15 to 30 inches; very fine sandy loam
Bw2—30 to 39 inches; very fine sandy loam
Bk—39 to 60 inches; very fine sandy loam

**Totelake and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Outwash terrace
*Slope:* 4 to 15 percent, south to north aspects
*Elevation:* 3,450 to 3,600 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Outwash derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 3.4 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; gravelly loam
Bw—5 to 22 inches; very gravelly sandy loam
2C—22 to 60 inches; extremely gravelly loamy sand

### *Additional Components*

*Wimper and similar soils:* 10 percent

## 541E—Finleypoint-Haskillpass-Wimper complex, 8 to 30 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,500 to 3,900 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 75 to 100 days

### *Component Description*

**Finleypoint and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, southeast to west aspects
*Elevation:* 3,500 to 3,900 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Cobbly silt loam
*Depth to restrictive feature:* None noted

*Drainage class:* Well drained
*Parent material:* Till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 7.7 inches
*Typical profile:*
A—0 to 10 inches; cobbly silt loam
E—10 to 20 inches; cobbly silt loam
E/Bw1—20 to 28 inches; very cobbly silt loam
E/Bw2—28 to 60 inches; very cobbly silt loam

**Haskillpass and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, southeast to west aspects
*Elevation:* 3,500 to 3,900 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 6.8 inches
*Typical profile:*
A—0 to 12 inches; ashy silt loam
Bw—12 to 18 inches; cobbly silt loam
2E—18 to 29 inches; very cobbly silt loam
2Bt—29 to 43 inches; very cobbly silt loam
2Bk—43 to 60 inches; very cobbly silt loam

**Wimper and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, southeast to west aspects
*Elevation:* 3,500 to 3,900 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
A—0 to 8 inches; gravelly silt loam
Bw—8 to 15 inches; gravelly silt loam
Bk—15 to 60 inches; very gravelly silt loam

### *Additional Components*

*Sharrott and similar soils:* 10 percent
*Rock outcrop:* 5 percent

# 542F—Finleypoint-Haskillpass-Rock outcrop complex, 15 to 50 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,500 to 4,200 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 75 to 100 days

### *Component Description*

**Finleypoint and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Moraine
*Slope:* 15 to 50 percent, southeast to west aspects
*Elevation:* 3,500 to 4,200 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Cobbly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 7.7 inches
*Typical profile:*
A—0 to 10 inches; cobbly silt loam
E—10 to 20 inches; cobbly silt loam
E/Bw1—20 to 28 inches; very cobbly silt loam
E/Bw2—28 to 60 inches; very cobbly silt loam

**Haskillpass and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 35 percent, southeast to west aspects
*Elevation:* 3,500 to 4,200 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 6.8 inches
*Typical profile:*
A—0 to 12 inches; ashy silt loam
Bw—12 to 18 inches; cobbly silt loam
2E—18 to 29 inches; very cobbly silt loam
2Bt—29 to 43 inches; very cobbly silt loam
2Bk—43 to 60 inches; very cobbly silt loam

**Rock outcrop**
*Composition:* 20 percent
*Geomorphic description:* None assigned

### *Additional Components*

*Sharrott and similar soils:* 10 percent
*Wimper and similar soils:* 10 percent

## 543D—Finleypoint-Wimper complex, 4 to 15 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,450 to 3,700 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 100 days

### *Component Description*

**Finleypoint and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Moraine
*Slope:* 4 to 15 percent, south to south aspects
*Elevation:* 3,450 to 3,700 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Cobbly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 7.7 inches
*Typical profile:*
A—0 to 10 inches; cobbly silt loam
E—10 to 20 inches; cobbly silt loam
E/Bw1—20 to 28 inches; very cobbly silt loam
E/Bw2—28 to 60 inches; very cobbly silt loam

**Wimper and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Moraine
*Slope:* 4 to 15 percent, south to south aspects
*Elevation:* 3,450 to 3,700 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches

*Typical profile:*
A—0 to 8 inches; gravelly silt loam
Bw—8 to 15 inches; gravelly silt loam
Bk—15 to 60 inches; very gravelly silt loam

### *Additional Components*

*Haskillpass and similar soils:* 10 percent
*Blackcreek and similar soils:* 5 percent
*Lostprairie and similar soils:* 5 percent
*Meadowpeak and similar soils:* 5 percent

## 633D—Rockhill-Rock outcrop-Pleasantvalley complex, 4 to 15 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,600 to 4,400 feet
*Mean annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Rockhill and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Glacially scoured ridge
*Slope:* 4 to 15 percent, east to west aspects
*Elevation:* 3,600 to 4,400 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly ashy silt loam
*Depth to restrictive feature:* Lithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 2.0 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; very gravelly ashy silt loam
Bw—5 to 14 inches; very gravelly ashy silt loam
2C—14 to 19 inches; extremely gravelly silt loam
R—19 to 60 inches; bedrock

**Rock outcrop**
*Composition:* 30 percent
*Geomorphic description:* None assigned

**Pleasantvalley and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Glacially scoured ridge
*Slope:* 4 to 15 percent, east to west aspects
*Elevation:* 3,600 to 4,400 feet

*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly ashy silt loam
Bw—4 to 14 inches; gravelly ashy silt loam
2E—14 to 26 inches; very cobbly silt loam
2E/Bw—26 to 34 inches; very cobbly silt loam
2E/Bt—34 to 60 inches; very cobbly silt loam

## 633F—Rockhill-Rock outcrop-Pleasantvalley complex, 15 to 50 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,500 to 5,200 feet
*Mean annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Rockhill and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Glacially scoured ridge
*Slope:* 15 to 50 percent, southeast to northwest aspects
*Elevation:* 3,500 to 5,200 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly ashy silt loam
*Depth to restrictive feature:* Lithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 2.0 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; very gravelly ashy silt loam
Bw—5 to 14 inches; very gravelly ashy silt loam
2C—14 to 19 inches; extremely gravelly silt loam
R—19 to 60 inches; bedrock

**Rock outcrop**
*Composition:* 30 percent
*Geomorphic description:* None assigned

**Pleasantvalley and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Glacially scoured ridge
*Slope:* 15 to 50 percent, southeast to northwest aspects
*Elevation:* 3,500 to 5,200 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly ashy silt loam
Bw—4 to 14 inches; gravelly ashy silt loam
2E—14 to 26 inches; very cobbly silt loam
2E/Bw—26 to 34 inches; very cobbly silt loam
2E/Bt—34 to 60 inches; very cobbly silt loam

## 634F—Rockhill-Rock outcrop-Courville complex, 15 to 50 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,500 to 5,100 feet
*Mean annual precipitation:* 24 to 32 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Rockhill and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Glacially scoured ridge
*Slope:* 15 to 50 percent, north to east aspects
*Elevation:* 3,500 to 5,100 feet
*Effective annual precipitation:* 24 to 32 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly ashy silt loam
*Depth to restrictive feature:* Lithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 2.0 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; very gravelly ashy silt loam
Bw—5 to 14 inches; very gravelly ashy silt loam

2C—14 to 19 inches; extremely gravelly silt loam
R—19 to 60 inches; bedrock

**Rock outcrop**
*Composition:* 30 percent
*Geomorphic description:* None assigned

**Courville and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Glacially scoured ridge
*Slope:* 15 to 50 percent, north to east aspects
*Elevation:* 3,500 to 5,100 feet
*Effective annual precipitation:* 24 to 32 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.2 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 10 inches; gravelly ashy silt loam
2E—10 to 22 inches; very cobbly fine sandy loam
2E/Bw—22 to 60 inches; very cobbly fine sandy loam

## 671E—Glaciercreek-Pleasantvalley complex, 8 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,700 to 4,400 feet
*Mean annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Glaciercreek and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Kame terrace
*Slope:* 8 to 30 percent, east to west aspects
*Elevation:* 3,700 to 4,400 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Volcanic ash over outwash
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 2.9 inches

*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 11 inches; gravelly ashy silt loam
2BC—11 to 18 inches; very cobbly coarse sandy loam
2C—18 to 60 inches; extremely cobbly loamy coarse sand

**Pleasantvalley and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Kame terrace, moraine
*Slope:* 8 to 30 percent, east to west aspects
*Elevation:* 3,700 to 4,400 feet
*Effective annual precipitation:* 22 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over outwash and/or till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.3 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly ashy silt loam
Bw—4 to 14 inches; gravelly ashy silt loam
2E—14 to 26 inches; very cobbly silt loam
2E/Bw—26 to 34 inches; very cobbly silt loam
2E/Bt—34 to 60 inches; very cobbly silt loam

### *Additional Components*

*Winfall and similar soils:* 10 percent
*Courville and similar soils:* 5 percent
*Crystalex and similar soils:* 5 percent
*Tamarack and similar soils:* 5 percent

## 681C—Tamarack-Crystalex-Glaciercreek complex, dry, 2 to 8 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,450 to 3,600 feet
*Mean annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Tamarack and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Outwash terrace
*Slope:* 2 to 8 percent, northwest to south aspects
*Elevation:* 3,450 to 3,600 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days

*Surface layer texture:* Ashy loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over outwash
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 7.3 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 5 inches; ashy loam
Bw—5 to 14 inches; ashy loam
2E and Bt—14 to 46 inches; sandy loam
2C—46 to 60 inches; loamy coarse sand

**Crystalex and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Outwash terrace
*Slope:* 2 to 8 percent, northwest to south aspects
*Elevation:* 3,450 to 3,600 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loamy coarse sand
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Wind-modified outwash
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.7 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 22 inches; loamy coarse sand
E and Bt—22 to 60 inches; loamy sand

**Glaciercreek and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Outwash terrace
*Slope:* 2 to 8 percent, northwest to south aspects
*Elevation:* 3,450 to 3,600 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Volcanic ash over outwash derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 2.9 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 11 inches; gravelly ashy silt loam
2BC—11 to 18 inches; very cobbly coarse sandy loam
2C—18 to 60 inches; extremely cobbly loamy coarse sand

### *Additional Components*

*Blackcreek and similar soils:* 5 percent
*Half Moon and similar soils:* 5 percent
*Loonlake and similar soils:* 5 percent

## 701D—Half Moon, cool-Lynchlake complex, 4 to 15 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,500 to 4,200 feet
*Mean annual precipitation:* 24 to 30 inches
*Frost-free period:* 40 to 90 days

### *Component Description*

**Half Moon and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Collapsed lake plain
*Slope:* 4 to 15 percent, north to southeast aspects
*Elevation:* 3,500 to 4,200 feet
*Effective annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Glaciolacustrine deposits
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 11.5 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 6 inches; silt loam
E/Bt—6 to 11 inches; silt loam
Bt—11 to 28 inches; silty clay loam
Bk—28 to 43 inches; silt loam
C—43 to 60 inches; silt loam

**Lynchlake and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Collapsed lake plain
*Slope:* 4 to 15 percent, north to southeast aspects
*Elevation:* 3,500 to 4,200 feet
*Effective annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over glaciolacustrine deposits
*Native plant cover type:* Forestland
*Flooding:* None

*Available water capacity:* Mainly 11.1 inches
*Typical profile:*
Oi—0 to 3 inches; slightly decomposed plant material
E—3 to 9 inches; ashy silt loam
Bw—9 to 15 inches; ashy silt loam
2E/Bt—15 to 23 inches; silt loam
2Bt—23 to 41 inches; silty clay loam
2Bk—41 to 60 inches; silt loam

### *Additional Components*

*Auggie and similar soils:* 10 percent
*Crystalex and similar soils:* 3 percent
*Glaciercreek and similar soils:* 2 percent

## 702E—Half Moon, cool-Half Moon complex, 8 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,500 to 4,200 feet
*Mean annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Half Moon, cool and similar soils**
*Composition:* 40 percent
*Geomorphic description:* Collapsed lake plain
*Slope:* 8 to 30 percent, north to southeast aspects
*Elevation:* 3,500 to 4,200 feet
*Effective annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Glaciolacustrine deposits
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 11.5 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 6 inches; silt loam
E/Bt—6 to 11 inches; silt loam
Bt—11 to 28 inches; silty clay loam
Bk—28 to 43 inches; silt loam
C—43 to 60 inches; silt loam

**Half Moon and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Collapsed lake plain
*Slope:* 8 to 30 percent, southeast to west aspects
*Elevation:* 3,500 to 4,200 feet

*Effective annual precipitation:* 24 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Glaciolacustrine deposits
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 11.5 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 6 inches; silt loam
E/Bt—6 to 11 inches; silt loam
Bt—11 to 28 inches; silty clay loam
Bk—28 to 43 inches; silt loam
C—43 to 60 inches; silt loam

### *Additional Components*

*Lynchlake and similar soils:* 10 percent
*Blackcreek and similar soils:* 5 percent
*Lynchlake, dry and similar soils:* 5 percent
*Pleasantvalley and similar soils:* 5 percent
*Tallcreek and similar soils:* 5 percent

## 710E—Kingspoint-McMannamy complex, 8 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 2,900 to 4,600 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Kingspoint and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Moraine
*Slope:* 15 to 30 percent, north to south aspects
*Elevation:* 2,900 to 4,600 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.8 inches

*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly silt loam
Bw—4 to 16 inches; very gravelly silt loam
Bk—16 to 60 inches; very gravelly silt loam

**McMannamy and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, north to south aspects
*Elevation:* 2,900 to 4,600 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.2 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 11 inches; gravelly silt loam
Bt—11 to 22 inches; very gravelly silt loam
Bk—22 to 60 inches; very gravelly silt loam

### *Additional Components*

*Rock outcrop:* 5 percent
*Sharrott and similar soils:* 5 percent

## 711F—Kingspoint-Rock outcrop-Sharrott complex, 15 to 50 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 2,900 to 5,400 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Kingspoint and similar soils**
*Composition:* 60 percent
*Geomorphic description:* Glaciated mountain slope
*Slope:* 15 to 50 percent, north to south aspects
*Elevation:* 2,900 to 5,400 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone

*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.8 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly silt loam
Bw—4 to 16 inches; very gravelly silt loam
Bk—16 to 60 inches; very gravelly silt loam

**Rock outcrop**
*Composition:* 15 percent
*Geomorphic description:* None assigned

**Sharrott and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Glacially scoured ridge
*Slope:* 15 to 50 percent, north to south aspects
*Elevation:* 2,900 to 5,400 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Lithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from quartzite and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 1.6 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; gravelly loam
Bw—5 to 11 inches; very gravelly loam
BC—11 to 13 inches; extremely gravelly loam
R—13 to 60 inches; bedrock

### *Additional Components*

*McMannamy and similar soils:* 5 percent
*Repp and similar soils:* 5 percent

## 712E—Kingspoint-Rock outcrop complex, 8 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,100 to 4,600 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Kingspoint and similar soils**
*Composition:* 70 percent
*Geomorphic description:* Moraine

*Slope:* 8 to 30 percent, south to north aspects
*Elevation:* 3,100 to 4,600 feet
*Effective annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.8 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly silt loam
Bw—4 to 16 inches; very gravelly silt loam
Bk—16 to 60 inches; very gravelly silt loam

**Rock outcrop**
*Composition:* 15 percent
*Geomorphic description:* None assigned

### *Additional Components*

*McMannamy and similar soils:* 5 percent
*Repp and similar soils:* 5 percent
*Sharrott and similar soils:* 5 percent

## 732A—Meadowpeak-Blacklake-McGregor complex, 0 to 2 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,100 to 4,100 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 100 days

### *Component Description*

**Meadowpeak and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 2 percent
*Elevation:* 3,100 to 4,100 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Frequent
*Water table:* Present
*Available water capacity:* Mainly 10.1 inches

*Typical profile:*
A—0 to 4 inches; silt loam
C1—4 to 25 inches; silt loam
C2—25 to 34 inches; stratified loam to silt loam
C3—34 to 60 inches; stratified very fine sandy loam to silt

**Blacklake and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Depression
*Slope:* 0 to 1 percent
*Elevation:* 3,100 to 4,100 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Organic material over alluvium
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Ponding duration:* Very long
*Available water capacity:* Mainly 14.8 inches
*Typical profile:*
Oe—0 to 14 inches; mucky peat
C1—14 to 31 inches; mucky silt loam
C2—31 to 60 inches; stratified very fine sandy loam to silt loam

**McGregor and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Closed depression
*Slope:* 0 to 2 percent
*Elevation:* 3,100 to 4,100 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Volcanic ash over alluvium and/or lacustrine deposits
*Native plant cover type:* Rangeland
*Flooding:* None
*Water table:* Present
*Ponding duration:* Brief
*Available water capacity:* Mainly 10.1 inches
*Typical profile:*
A—0 to 5 inches; ashy silt loam
E—5 to 14 inches; ashy silt loam
2E—14 to 16 inches; silt loam
2BC—16 to 26 inches; very fine sandy loam
3Cg—26 to 60 inches; silt loam

### *Additional Components*

*Barzee and similar soils:* 5 percent
*Lostprairie and similar soils:* 5 percent

## 741C—Blackcreek silt loam, 0 to 8 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,400 to 4,500 feet
*Mean annual precipitation:* 20 to 26 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Blackcreek and similar soils**
*Composition:* 80 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 8 percent, west to east aspects
*Elevation:* 3,400 to 4,500 feet
*Effective annual precipitation:* 20 to 26 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Rangeland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 9.1 inches
*Typical profile:*
A—0 to 4 inches; silt loam
Bw—4 to 10 inches; silt loam
Bk—10 to 36 inches; silt loam
C—36 to 42 inches; silt
2C—42 to 60 inches; stratified loamy coarse sand to silt

### *Additional Components*

*Tamarack and similar soils:* 10 percent
*Meadowpeak, occasionally flooded and similar soils:* 5 percent
*Tallcreek and similar soils:* 5 percent

## 761F—Castner-Wimper-Rock outcrop complex, 15 to 50 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 2,900 to 4,400 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 100 days

### *Component Description*

**Castner and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Glaciated mountain slope

*Slope:* 15 to 50 percent, east to southwest aspects
*Elevation:* 2,900 to 4,400 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 80 to 100 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* Lithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from siltstone
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.3 inches
*Typical profile:*
A—0 to 14 inches; gravelly silt loam
Bk—14 to 19 inches; very gravelly silt loam
R—19 to 60 inches; bedrock

**Wimper and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Glaciated mountain slope
*Slope:* 15 to 50 percent, east to southwest aspects
*Elevation:* 2,900 to 4,400 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
A—0 to 8 inches; gravelly silt loam
Bw—8 to 15 inches; gravelly silt loam
Bk—15 to 60 inches; very gravelly silt loam

**Rock outcrop**
*Composition:* 20 percent
*Geomorphic description:* None assigned

### *Additional Components*

*Kingspoint and similar soils:* 10 percent
*Repp and similar soils:* 10 percent

## 807A—McLangor-Barzee mucky peats, 0 to 2 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,400 to 4,000 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days

### *Component Description*

**McLangor and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Depression, flood plain
*Slope:* 0 to 2 percent
*Elevation:* 3,400 to 4,000 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Organic material over alluvium
*Native plant cover type:* Rangeland
*Flooding:* Frequent
*Water table:* Present
*Available water capacity:* Mainly 18.8 inches
*Typical profile:*
Oe1—0 to 8 inches; mucky peat
Oe2—8 to 17 inches; mucky peat
C1—17 to 36 inches; stratified very fine sandy loam to silt
C2—36 to 42 inches; stratified mucky peat to silt loam
Oa—42 to 54 inches; muck
Cg—54 to 60 inches; stratified very fine sandy loam to silt

**Barzee and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Depression, flood plain
*Slope:* 0 to 1 percent
*Elevation:* 3,400 to 4,000 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Organic material
*Native plant cover type:* Rangeland
*Flooding:* Frequent
*Water table:* Present
*Available water capacity:* Mainly 26.6 inches
*Typical profile:*
Oi—0 to 4 inches; mucky peat
Oe—4 to 60 inches; mucky peat

### *Additional Components*

*Blacklake and similar soils:* 10 percent
*McGregor and similar soils:* 5 percent
*Meadowpeak and similar soils:* 5 percent

## 808A—Barzee mucky peat, 0 to 1 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin

*Elevation:* 3,100 to 3,900 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days

### *Component Description*

**Barzee and similar soils**
*Composition:* 80 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 1 percent
*Elevation:* 3,100 to 3,900 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Mucky peat
*Depth to restrictive feature:* None noted
*Drainage class:* Very poorly drained
*Parent material:* Organic material
*Native plant cover type:* Rangeland
*Flooding:* Frequent
*Water table:* Present
*Available water capacity:* Mainly 26.6 inches
*Typical profile:*
Oi—0 to 4 inches; mucky peat
Oe—4 to 60 inches; mucky peat

### *Additional Components*

*McLangor and similar soils:* 10 percent
*Blacklake and similar soils:* 6 percent
*McGregor and similar soils:* 2 percent
*Meadowpeak and similar soils:* 2 percent

## 811F—Foyslake-Rock outcrop complex, 20 to 50 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,100 to 5,200 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Foyslake and similar soils**
*Composition:* 75 percent
*Geomorphic description:* Moraine
*Slope:* 20 to 50 percent, north to east aspects
*Elevation:* 3,100 to 5,200 feet
*Effective annual precipitation:* 21 to 27 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained

*Parent material:* Till derived from calcareous siltstone and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 12 inches; gravelly silt loam
Bt/E—12 to 21 inches; gravelly silt loam
Bt—21 to 28 inches; very gravelly silty clay loam
Bk—28 to 60 inches; very cobbly silt loam

### *Additional Components*

*McMannamy and similar soils:* 10 percent

### *Component Description*

**Rock outcrop**
*Composition:* 10 percent
*Geomorphic description:* None assigned

### *Additional Components*

*Kingspoint and similar soils:* 3 percent
*Sharrott and similar soils:* 2 percent

## 812C—Foyslake-Glaciercreek complex, 2 to 8 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,800 to 4,100 feet
*Mean annual precipitation:* 20 to 28 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Foyslake and similar soils**
*Composition:* 80 percent
*Geomorphic description:* Moraine
*Slope:* 2 to 8 percent, east to west aspects
*Elevation:* 3,800 to 4,100 feet
*Effective annual precipitation:* 20 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 12 inches; gravelly silt loam

Bt/E—12 to 21 inches; gravelly silt loam
Bt—21 to 28 inches; very gravelly silty clay loam
Bk—28 to 60 inches; very cobbly silt loam

**Glaciercreek and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Outwash terrace
*Slope:* 2 to 8 percent, east to west aspects
*Elevation:* 3,800 to 4,100 feet
*Effective annual precipitation:* 20 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Volcanic ash over outwash derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 2.9 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 11 inches; gravelly ashy silt loam
2BC—11 to 18 inches; very cobbly coarse sandy loam
2C—18 to 60 inches; extremely cobbly loamy coarse sand

## 831D—Ashleylake-Foyslake-Kila complex, 0 to 15 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 2,900 to 4,400 feet
*Mean annual precipitation:* 22 to 30 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Ashleylake and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Moraine
*Slope:* 4 to 15 percent, south to north aspects
*Elevation:* 2,900 to 4,400 feet
*Effective annual precipitation:* 22 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from argillite and/or calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 7.4 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 14 inches; cobbly ashy silt loam

E/Bt—14 to 23 inches; very cobbly silt loam
Bt/E—23 to 30 inches; very cobbly silty clay loam
Bt—30 to 40 inches; very cobbly silty clay loam
Bk—40 to 60 inches; very cobbly silt loam

**Foyslake and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Moraine
*Slope:* 4 to 15 percent, south to north aspects
*Elevation:* 2,900 to 4,400 feet
*Effective annual precipitation:* 22 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 12 inches; gravelly silt loam
Bt/E—12 to 21 inches; gravelly silt loam
Bt—21 to 28 inches; very gravelly silty clay loam
Bk—28 to 60 inches; very cobbly silt loam

**Kila and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Outwash terrace
*Slope:* 0 to 4 percent, south to north aspects
*Elevation:* 2,900 to 4,400 feet
*Effective annual precipitation:* 22 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Moderately well drained
*Parent material:* Outwash over till
*Native plant cover type:* Forestland
*Flooding:* None
*Water table:* Present
*Available water capacity:* Mainly 10.4 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 8 inches; ashy silt loam
Bw—8 to 22 inches; ashy silt loam
Bk—22 to 41 inches; silt loam
2C—41 to 60 inches; very gravelly silt loam

### *Additional Components*

*Idahocreek and similar soils:* 5 percent

# 835G—Ashleylake-Rock outcrop-Rockhill complex, 40 to 70 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,400 to 4,200 feet
*Mean annual precipitation:* 22 to 30 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Ashleylake and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Glacially scoured ridge
*Slope:* 40 to 60 percent, west to east aspects
*Elevation:* 3,400 to 4,200 feet
*Effective annual precipitation:* 22 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Cobbly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Volcanic ash over till derived from argillite and/or calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 7.4 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 14 inches; cobbly ashy silt loam
E/Bt—14 to 23 inches; very cobbly silt loam
Bt/E—23 to 30 inches; very cobbly silty clay loam
Bt—30 to 40 inches; very cobbly silty clay loam
Bk—40 to 60 inches; very cobbly silt loam

**Rock outcrop**
*Composition:* 15 percent
*Geomorphic description:* None assigned

**Rockhill and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Glacially scoured ridge
*Slope:* 40 to 70 percent, west to east aspects
*Elevation:* 3,400 to 4,200 feet
*Effective annual precipitation:* 22 to 30 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Very gravelly ashy silt loam
*Depth to restrictive feature:* Lithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Volcanic ash over colluvium derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 2.0 inches

*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; very gravelly ashy silt loam
Bw—5 to 14 inches; very gravelly ashy silt loam
2C—14 to 19 inches; extremely gravelly silt loam
R—19 to 60 inches; bedrock

### *Additional Components*

*Foyslake and similar soils:* 10 percent
*Mitten and similar soils:* 10 percent

## 872E—Pashua-Pashua, deep complex, 8 to 30 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,200 to 4,600 feet
*Mean annual precipitation:* 19 to 24 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Pashua and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 30 percent, east to northwest aspects
*Elevation:* 3,200 to 4,600 feet
*Effective annual precipitation:* 19 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches
*Typical profile:*
A—0 to 8 inches; gravelly loam
E—8 to 14 inches; gravelly silt loam
Bt/E—14 to 19 inches; gravelly clay
Bt1—19 to 25 inches; clay
Bt2—25 to 37 inches; gravelly clay loam
Cr—37 to 60 inches; bedrock

**Pashua, deep and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Mountain slope
*Slope:* 8 to 30 percent, east to northwest aspects
*Elevation:* 3,200 to 4,600 feet
*Effective annual precipitation:* 19 to 24 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam

*Depth to restrictive feature:* Paralithic bedrock: 40 to 60 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 7.1 inches
*Typical profile:*
A—0 to 8 inches; gravelly loam
E—8 to 14 inches; gravelly silt loam
Bt/E—14 to 19 inches; gravelly clay
Bt1—19 to 41 inches; clay
Bt2—41 to 58 inches; gravelly clay loam
Cr—58 to 60 inches; bedrock

### *Additional Components*

*Battlebutte and similar soils:* 10 percent
*Rock outcrop, welded tuff:* 10 percent
*Battlebutte, greater slope and similar soils:* 5 percent

## 872F—Pashua-Battlebutte, moist-Rock outcrop, welded tuff complex, 30 to 60 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,300 to 4,300 feet
*Mean annual precipitation:* 19 to 23 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Pashua and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Mountain slope
*Slope:* 30 to 60 percent, northeast to west aspects
*Elevation:* 3,300 to 4,300 feet
*Effective annual precipitation:* 19 to 23 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 20 to 40 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 4.6 inches
*Typical profile:*
A—0 to 8 inches; gravelly loam
E—8 to 14 inches; gravelly silt loam
Bt/E—14 to 19 inches; gravelly clay
Bt1—19 to 25 inches; clay
Bt2—25 to 37 inches; gravelly clay loam
Cr—37 to 60 inches; bedrock

**Battlebutte and similar soils**
*Composition:* 20 percent
*Geomorphic description:* Mountain slope
*Slope:* 30 to 60 percent, northeast to west aspects
*Elevation:* 3,300 to 4,300 feet
*Effective annual precipitation:* 19 to 23 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* Paralithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from welded tuff
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 1.9 inches
*Typical profile:*
A—0 to 8 inches; gravelly loam
Bw1—8 to 13 inches; gravelly loam
Bw2—13 to 19 inches; gravelly loam
Cr—19 to 60 inches; bedrock

**Rock outcrop, welded tuff**
*Composition:* 15 percent
*Geomorphic description:* None assigned

### *Additional Components*

*Pashua, deep and similar soils:* 5 percent
*Pashua, lesser slope and similar soils:* 5 percent

## 881D—Lesier, dry-Foyslake-Glaciercreek complex, 4 to 15 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 3,800 to 4,100 feet
*Mean annual precipitation:* 19 to 28 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Lesier, dry and similar soils**
*Composition:* 65 percent
*Geomorphic description:* Moraine, outwash terrace
*Slope:* 4 to 15 percent, west to north aspects
*Elevation:* 3,800 to 4,100 feet
*Effective annual precipitation:* 20 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over outwash and/or till
*Native plant cover type:* Forestland
*Flooding:* None

*Available water capacity:* Mainly 4.3 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 2 inches; gravelly ashy silt loam
Bw—2 to 11 inches; gravelly ashy silt loam
2E—11 to 18 inches; very gravelly sandy loam
2Bk1—18 to 35 inches; extremely cobbly sandy loam
2Bk2—35 to 60 inches; extremely cobbly sandy loam

**Foyslake and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Moraine, outwash terrace
*Slope:* 4 to 15 percent, west to north aspects
*Elevation:* 3,800 to 4,100 feet
*Effective annual precipitation:* 20 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Outwash and/or till derived from calcareous siltstone and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 12 inches; gravelly silt loam
Bt/E—12 to 21 inches; gravelly silt loam
Bt—21 to 28 inches; very gravelly silty clay loam
Bk—28 to 60 inches; very cobbly silt loam

**Glaciercreek and similar soils**
*Composition:* 10 percent
*Geomorphic description:* Moraine, outwash terrace
*Slope:* 4 to 15 percent, west to north aspects
*Elevation:* 3,800 to 4,100 feet
*Effective annual precipitation:* 20 to 28 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Excessively drained
*Parent material:* Volcanic ash over outwash and/or till derived from quartzite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 2.9 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
Bw—1 to 11 inches; gravelly ashy silt loam
2BC—11 to 18 inches; very cobbly coarse sandy loam
2C—18 to 60 inches; extremely cobbly loamy coarse sand

### *Additional Components*

*Lesier, greater slope and similar soils:* 10 percent

# 882C—Lesier, dry-Half Moon, cool complex, 2 to 8 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,150 to 3,600 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Lesier and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Outwash terrace
*Slope:* 2 to 8 percent, south to northeast aspects
*Elevation:* 3,150 to 3,600 feet
*Effective annual precipitation:* 21 to 27 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly ashy silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Somewhat excessively drained
*Parent material:* Volcanic ash over outwash
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 4.3 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 2 inches; gravelly ashy silt loam
Bw—2 to 11 inches; gravelly ashy silt loam
2E—11 to 18 inches; very gravelly sandy loam
2Bk1—18 to 35 inches; extremely cobbly sandy loam
2Bk2—35 to 60 inches; extremely cobbly sandy loam

**Half Moon and similar soils**
*Composition:* 30 percent
*Geomorphic description:* Outwash terrace
*Slope:* 2 to 8 percent, south to northeast aspects
*Elevation:* 3,150 to 3,600 feet
*Effective annual precipitation:* 21 to 27 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Outwash and/or glaciolacustrine deposits
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 11.5 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 6 inches; silt loam
E/Bt—6 to 11 inches; silt loam
Bt—11 to 28 inches; silty clay loam

Bk—28 to 43 inches; silt loam
C—43 to 60 inches; silt loam

### *Additional Components*

*Trumancreek and similar soils:* 10 percent
*Foyslake and similar soils:* 5 percent
*McGregor and similar soils:* 5 percent

## 901E—Wimper-Castner complex, 8 to 30 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,400 to 3,800 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days

### *Component Description*

**Wimper and similar soils**
*Composition:* 70 percent
*Geomorphic description:* Glaciated mountain slope
*Slope:* 15 to 30 percent, east to southwest aspects
*Elevation:* 3,400 to 3,800 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
A—0 to 8 inches; gravelly silt loam
Bw—8 to 15 inches; gravelly silt loam
Bk—15 to 60 inches; very gravelly silt loam

**Castner and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Glaciated mountain slope
*Slope:* 8 to 30 percent, east to southwest aspects
*Elevation:* 3,400 to 3,800 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* Lithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from siltstone
*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.3 inches

*Typical profile:*
A—0 to 14 inches; gravelly silt loam
Bk—14 to 19 inches; very gravelly silt loam
R—19 to 60 inches; bedrock

### *Additional Components*

*Rock outcrop:* 8 percent
*Kingspoint and similar soils:* 7 percent

## 902F—Wimper-Rock outcrop-Castner complex 15 to 50 percent slopes

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 3,150 to 5,000 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Wimper and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Glaciated mountain slope
*Slope:* 15 to 50 percent, east to west aspects
*Elevation:* 3,150 to 5,000 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
A—0 to 8 inches; gravelly silt loam
Bw—8 to 15 inches; gravelly silt loam
Bk—15 to 60 inches; very gravelly silt loam

**Rock outcrop**
*Composition:* 20 percent
*Geomorphic description:* None assigned

**Castner and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Glaciated mountain slope
*Slope:* 15 to 50 percent, east to west aspects
*Elevation:* 3,150 to 5,000 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 75 to 95 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* Lithic bedrock: 10 to 20 inches
*Drainage class:* Well drained
*Parent material:* Colluvium over residuum weathered from siltstone

*Native plant cover type:* Rangeland
*Flooding:* None
*Available water capacity:* Mainly 2.3 inches
*Typical profile:*
A—0 to 14 inches; gravelly silt loam
Bk—14 to 19 inches; very gravelly silt loam
R—19 to 60 inches; bedrock

### *Additional Components*

*Kingspoint and similar soils:* 5 percent
*Repp and similar soils:* 5 percent

## 931G—Repp-Kingspoint-Rock outcrop complex, 40 to 80 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 2,900 to 4,700 feet
*Mean annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Repp and similar soils**
*Composition:* 50 percent
*Geomorphic description:* Glaciated mountain slope
*Slope:* 40 to 80 percent, southeast to northwest aspects
*Elevation:* 2,900 to 4,700 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Colluvium derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 5.4 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 7 inches; gravelly loam
E/Bw—7 to 19 inches; gravelly loam
Bw—19 to 32 inches; very gravelly loam
Bk—32 to 60 inches; extremely gravelly loam

**Kingspoint and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Glaciated mountain slope
*Slope:* 40 to 60 percent, southeast to northwest aspects
*Elevation:* 2,900 to 4,700 feet
*Effective annual precipitation:* 18 to 25 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam

*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.8 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly silt loam
Bw—4 to 16 inches; very gravelly silt loam
Bk—16 to 60 inches; very gravelly silt loam

**Rock outcrop**
*Composition:* 25 percent
*Geomorphic description:* None assigned

## 941C—Trumancreek-Foyslake-Blackcreek complex, 0 to 12 percent slopes

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 2,900 to 4,100 feet
*Mean annual precipitation:* 18 to 24 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Trumancreek and similar soils**
*Composition:* 45 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent, west to east aspects
*Elevation:* 2,900 to 4,100 feet
*Effective annual precipitation:* 21 to 27 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium
*Native plant cover type:* Forestland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 6.4 inches
*Typical profile:*
A—0 to 7 inches; loam
Bw—7 to 22 inches; silt loam
C1—22 to 28 inches; loam
2C2—28 to 35 inches; extremely gravelly loamy coarse sand
3Cg1—35 to 37 inches; gravelly clay loam
4Cg2—37 to 60 inches; extremely gravelly loamy coarse sand

**Foyslake and similar soils**
*Composition:* 25 percent
*Geomorphic description:* Moraine

*Slope:* 2 to 12 percent, west to east aspects
*Elevation:* 2,900 to 4,100 feet
*Effective annual precipitation:* 21 to 27 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 12 inches; gravelly silt loam
Bt/E—12 to 21 inches; gravelly silt loam
Bt—21 to 28 inches; very gravelly silty clay loam
Bk—28 to 60 inches; very cobbly silt loam

**Blackcreek and similar soils**
*Composition:* 15 percent
*Geomorphic description:* Flood plain
*Slope:* 0 to 4 percent, west to east aspects
*Elevation:* 2,900 to 4,100 feet
*Effective annual precipitation:* 21 to 27 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Poorly drained
*Parent material:* Alluvium and/or outwash
*Native plant cover type:* Forestland
*Flooding:* Rare
*Water table:* Present
*Available water capacity:* Mainly 9.1 inches
*Typical profile:*
A—0 to 4 inches; silt loam
Bw—4 to 10 inches; silt loam
Bk—10 to 36 inches; silt loam
C—36 to 42 inches; silt
2C—42 to 60 inches; stratified loamy coarse sand to silt

### *Additional Components*

*Idahocreek and similar soils:* 10 percent
*Kila and similar soils:* 5 percent

## 1044D—Eaglewing gravelly silt loam, 8 to 15 percent slopes, lake effect

### *Map Unit Setting*

*Field investigation intensity:* Order 2
*Landscape:* Intermontane basin
*Elevation:* 2,890 to 3,730 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Eaglewing and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 15 percent, north to south aspects
*Elevation:* 2,890 to 3,730 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 9.0 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 12 inches; gravelly silt loam
Bw—12 to 21 inches; gravelly silt loam
Bk—21 to 60 inches; gravelly silt loam

### *Additional Components*

*Kingspoint and similar soils:* 8 percent
*Poorly drained soils and similar soils:* 3 percent
*Somewhat poorly drained soils and similar soils:* 3 percent
*Eaglewing, stony silt loam and similar soils:* 1 percent

## 1071E—Kingspoint gravelly silt loam, 15 to 30 percent slopes, lake effect

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 2,890 to 3,720 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Kingspoint and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Moraine
*Slope:* 15 to 30 percent, north to south aspects
*Elevation:* 2,890 to 3,720 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None

*Available water capacity:* Mainly 6.8 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly silt loam
Bw—4 to 16 inches; very gravelly silt loam
Bk—16 to 60 inches; very gravelly silt loam

### *Additional Components*

*McMannamy and similar soils:* 12 percent
*Rock outcrop:* 1 percent
*Sharrott and similar soils:* 1 percent
*Wimper and similar soils:* 1 percent

## 1081E—Foyslake gravelly silt loam, 15 to 30 percent slopes, lake effect

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 2,960 to 3,650 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 90 days

### *Component Description*

**Foyslake and similar soils**
*Composition:* 85 percent
*Geomorphic description:* Moraine
*Slope:* 15 to 30 percent, west to east aspects
*Elevation:* 2,960 to 3,650 feet
*Effective annual precipitation:* 21 to 26 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.3 inches
*Typical profile:*
Oi—0 to 2 inches; slightly decomposed plant material
E—2 to 12 inches; gravelly silt loam
Bt/E—12 to 21 inches; gravelly silt loam
Bt—21 to 28 inches; very gravelly silty clay loam
Bk—28 to 60 inches; very cobbly silt loam

### *Additional Components*

*McMannamy and similar soils:* 10 percent
*Kila and similar soils:* 3 percent
*Blackcreek and similar soils:* 2 percent

# 1710E—Kingspoint-McMannamy complex, 8 to 30 percent slopes, lake effect

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 2,890 to 3,650 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Kingspoint and similar soils**
*Composition:* 55 percent
*Geomorphic description:* Moraine
*Slope:* 15 to 30 percent, northwest to east aspects
*Elevation:* 2,890 to 3,650 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.8 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly silt loam
Bw—4 to 16 inches; very gravelly silt loam
Bk—16 to 60 inches; very gravelly silt loam

**McMannamy and similar soils**
*Composition:* 35 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, northwest to east aspects
*Elevation:* 2,890 to 3,650 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone and/or argillite
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 8.2 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 11 inches; gravelly silt loam
Bt—11 to 22 inches; very gravelly silt loam
Bk—22 to 60 inches; very gravelly silt loam

### *Additional Components*

*Rock outcrop:* 5 percent
*Sharrott and similar soils:* 5 percent

## 1712E—Kingspoint-Rock outcrop complex, 8 to 30 percent slopes, lake effect

### *Map Unit Setting*

*Interpretive focus:* Forest
*Field investigation intensity:* Order 2
*Landscape:* Mountains
*Elevation:* 2,890 to 3,760 feet
*Mean annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 95 days

### *Component Description*

**Kingspoint and similar soils**
*Composition:* 70 percent
*Geomorphic description:* Moraine
*Slope:* 8 to 30 percent, north to south aspects
*Elevation:* 2,890 to 3,760 feet
*Effective annual precipitation:* 18 to 22 inches
*Frost-free period:* 70 to 90 days
*Surface layer texture:* Gravelly silt loam
*Depth to restrictive feature:* None noted
*Drainage class:* Well drained
*Parent material:* Till derived from calcareous siltstone
*Native plant cover type:* Forestland
*Flooding:* None
*Available water capacity:* Mainly 6.8 inches
*Typical profile:*
Oi—0 to 1 inch; slightly decomposed plant material
E—1 to 4 inches; gravelly silt loam
Bw—4 to 16 inches; very gravelly silt loam
Bk—16 to 60 inches; very gravelly silt loam

**Rock outcrop**
*Composition:* 15 percent
*Geomorphic description:* None assigned

### *Additional Components*

*McMannamy and similar soils:* 5 percent
*Repp and similar soils:* 5 percent
*Sharrott and similar soils:* 5 percent

## W—Water

### *Map Unit Setting*

*Field investigation intensity:* Order 2

### *Component Description*

**Water**
*Composition:* 100 percent
*Geomorphic description:* None assigned

# Use and Management of the Soils

This soil survey is an inventory and evaluation of soils in the survey area. It can be used to coordinate land uses to the limitations and potentials of natural resources and the environment. In addition, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of soils. They collect data on soil physical properties, chemical properties, related site observations, and other factors that affect various soil uses and management. Field experience and collected performance data are used as a basis in predicting soil behavior.

Information in this section can be used to plan use and management of soils for crops and pasture; as rangeland and forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; for agricultural waste management; and as wildlife habitat. This information can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of gravel, sand, reclamation material, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, camp areas, playgrounds, lawns, and appropriate trees and shrubs.

## Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Some tables identify the limitations that affect specified uses and indicate the severity of those limitations. Other tables identify the potential or the degree of potential existing. Typically, the ratings in these tables are in both text and numerical format.

### Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for limitation classes are *not limited*, *somewhat limited*, and *very limited*. The suitability ratings are expressed as *well suited*, *moderately suited*, *poorly suited*, and *unsuited* or as *good*, *fair*, and *poor*.

### Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last. Potential interpretations are labeled as such, with the lower number having the lowest potential and the higher number having the greatest potential for a use or material.

## General Land Access and Management

The “Hazard of Erosion and Suitability for Roads and Trails” table shows interpretive ratings related to erosion hazard (off-road/off-trail), erosion hazard (road/trail), and road suitability (natural surface).

Ratings in the column *erosion hazard (off-road/off-trail)* are based on slope and on soil erodibility factor K. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of slight indicates that erosion is unlikely under ordinary climatic conditions; moderate indicates that some erosion is likely and that erosion-control measures may be needed; severe indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and very severe indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Ratings in the column *erosion hazard (road/trail)* are based on soil erodibility K factor, slope, and content of rock fragments. Ratings apply to unsurfaced roads and trails. The hazard is described as slight, moderate, or severe. A rating of slight indicates little or no erosion is likely. A rating of moderate indicates some erosion is likely; roads or trails may require occasional maintenance; and simple erosion-control measures are needed. A rating of severe indicates significant erosion is expected; roads or trails require frequent maintenance; and costly erosion-control measures are needed.

Ratings in the column *road suitability (natural surface)* are based on slope, rock fragments on the surface, plasticity index, content of sand, Unified classification, depth to a water table, ponding, flooding, and hazard of soil slippage. The ratings indicate the suitability for using the natural surface of the soil for roads. The soils are described as well suited, moderately suited, or poorly suited to this use.

The “Soil Damage by Fire, Fencing Limitations, and Soil Rutting Hazard” table shows interpretive ratings related to soil damage susceptibility by fire, fencing limitations, and soil rutting hazard.

Ratings in the column *soil damage susceptibility by fire* are based on texture of the surface layer, content of rock fragments and organic matter in the surface layer, thickness of the surface layer, and slope. The ratings indicate an evaluation of the potential impact of prescribed fires or wildfires intense enough to remove the duff layer and consume organic matter in the surface layer.

Rating class terms for *fencing limitations* are based on soil texture, flooding frequency, depth to bedrock, coarse fragments, shrink swell potential, slope, depth to water table, potential frost action, salinity, ponding, depth to cemented pan, and surface rock fragments. The soils are described as being very limited, limited, and not limited. Ratings indicate an evaluation of the limitation of the soil for installing fencing, typically driven, or dug, wooden or steel posts.

Ratings in the column *soil rutting hazard* are based on depth to a water table, rock fragments on or below the surface, Unified classification, depth to a restrictive layer, and slope. The operation of forest equipment may cause ruts to form. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates the soil is subject to little or no rutting; *moderate* indicates rutting is likely; and *severe* indicates ruts form readily.

# Agronomy

## Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed, and the system of land capability classification used by the Natural Resources Conservation Service is explained.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

## Yields per Acre

The average yields per acre shown in the yields table in this survey are those that can be expected of the principal crops under a high level of management. In any given year, yields may be higher or lower than those yields indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area is shown in the table.

Dryland small-grain yields (spring wheat, winter wheat, oats, and barley), as presented in the certified soils database and related publications in Montana, are generated using a Crop Yield Model (MT-CYM). This model is based on Montana Agricultural Experiment Station Report 35 (AES-35). AES-35 was revised, verified, and tested to encompass all dryland-cropped soils in the state from 1990 to the present, as the MT-CYM was programmed and maintained in the NRCS soils database. The resulting model consistently generates credible yields, stored not as traditional data but generated as the soils data is certified and, subsequently, included as interpretation results.

Crop yields provided in this publication other than for dryland small grains are database stored and gathered more traditionally, through yield reporting, farmer interviews, and other yield studies.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

Pasture yields are expressed in terms of animal unit months. An animal unit month (AUM) is the amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

The estimated yields reflect the productive capacity of each soil for each principal crop. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in the yields tables are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

## Cropland Management

Management concerns affecting the use of the detailed soil map units in the survey area for constructing grassed waterways, vegetating grassed waterways and filter strips, and sprinkler irrigation are shown in the “Cropland Management” table.

A *grassed waterway* is a natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. The grassed waterway conducts surface water away from cropland.

A *filter strip* is a vegetated strip typically less than 50 feet wide, seeded to grass or a mixture of grass and legumes, to remove sediment, nutrients, and bacteria, concentrated in runoff from adjacent cropland or feed lots.

*Sprinkler irrigation* is a method to apply water to soils to assist in the production of crops. A pressure system sprays water through pipes or nozzles over the soil surface.

## Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping soils do not include major and generally expensive landforming that would change slope, depth, or other soil characteristics, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, forestland, or engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. The unit level is not utilized in Montana. More information is available from the *National Soil Survey Handbook*, online at http://soils.usda.gov/technical/handbook/contents/part622.html#02.

*Capability classes*, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use. This class does not occur in Montana.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

*Capability subclasses* are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, 2e. The letter *e* shows the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows the chief limitation is climate that is very cold or very dry.

In class 1, there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

The productivity of soils and related capability class or subclass are shown in the "Land Capability and Yields per Acre of Crops and Pasture" table. The capability classification of map units in this survey area is given in the yields table.

## Prime Farmland and Other Important Farmland

The "Prime Farmland and Other Important Farmland" table lists the map units in the survey area that are considered prime farmland, unique farmland, and farmland of statewide or local importance. This list does not constitute a recommendation for a particular land use.

### Prime Farmland

In an effort to identify the extent and location of important farmland, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for production of the Nation's food supply.

*Prime farmland* is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is less than frequently flooded during the growing season or is protected

from flooding. Slope ranges mainly from 0 to 6 percent. Detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A trend in land use in some areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated or maintained in a healthy state when cropped.

The extent of each listed map unit is shown in the "Acreage and Proportionate Extent of the Soils" table. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

### Farmland of Statewide Importance

In some areas, land that does not meet the criteria for prime farmland or unique farmland is considered to be farmland of statewide importance for the production of food, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by state law.

Farmland of statewide importance is included in the list of prime farmland.

Criteria are available in the Field Office Technical Guide, Section II, which is available in local offices of the Natural Resources Conservation Service and online at http://www.nrcs.usda.gov/technical/efotg/.

In some areas that are not identified as having national or statewide importance, land is considered to be farmland of local importance for the production of food, feed, fiber, forage, and oilseed crops. This farmland is identified by the appropriate local agencies. Farmland of local importance may include tracts of land that have been designated for agriculture by local ordinance.

## Range

Barbara Landgraf Gibbons, Rangeland Management Specialist, Natural Resources Conservation Service, prepared this section.

Of the 283,700 acres in the survey area, approximately 7 percent supports rangeland vegetation and about 74 percent supports forestland that could potentially support understory vegetation suitable for livestock grazing. Most forestland is used for commercial purposes. Cow-calf operations are the major type of livestock enterprise. Ranches vary in size, averaging between 200 and 500 acres of private land; many ranches have grazing privileges on federal land or commercial forestland.

The rangeland and grazeable forest understory is primarily used for grazing domestic livestock; however, the understory is also used as wildlife habitat, recreation areas, and watershed and for esthetic value.

For areas that have similar climate and topography, differences in kind and amount of vegetation produced are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation.

The *National Range and Pasture Handbook* (http://www.glti.nrcs.usda.gov/technical/publications/nrph.html) defines *rangeland* as land on which the Historic Climax Plant Community (HCPC) is predominantly grasses, grasslike plants, forbs, or shrubs. Rangeland includes lands revegetated naturally or artificially when routine management is accomplished mainly through manipulation of grazing. Rangeland

includes natural grasslands, savannas, shrublands, most deserts, tundra, alpine communities, coastal marshes, and wet meadows.

*Grazeable forest understory* is defined as land on which the understory includes, as an integral part of the forest plant community, plants that can be grazed without significant impairment of other forest values.

The "Rangeland Ecological Sites and Forest Habitat Types with Production" table shows, for each listed soil, the rangeland ecological site or forest habitat type along with the Historic Climax Plant Community (HCPC) annual production of vegetation in favorable, normal, and unfavorable years. Only those soils used as rangeland or grazeable forest understory, or suited as rangeland or grazeable forest understory, are listed. Explanation of the column headings in this table follows.

The *National Range and Pasture Handbook* defines *ecological site* as a distinctive kind of rangeland, with specific physical characteristics, that differs from other kinds of rangeland in its ability to produce a distinctive kind and amount of vegetation. Montana NRCS' Ecological Site Description (ESD) naming and numbering policy is located online at http://www.glti.nrcs.usda.gov/technical/publications/nrph.html.

ESDs contain information about soils, physical features, associated hydrologic features, plant communities possible on the site, plant community dynamics, annual production estimates, associated animal communities, and associated similar sites and interpretations for grazing, wildlife, watershed, recreation, and other management uses. ESDs describe the HCPC or other reference plant community for the site. ESDs are being developed for each ecological site. Approved ESDs are located at http://esis.sc.egov.usda.gov/.

The relationship between soils and vegetation was ascertained during this survey; thus, ecological sites are listed for components that occur in the map units, evident on the soil map. Stocking rates and management opportunities are determined by the plants and vegetative production actually growing on a specific site. This existing plant community and production is obtained by onsite investigations performed in the planning process.

Habitat type is an aggregation of all land areas capable of producing similar climax plant communities. Habitat types are considered basic ecological subdivisions of landscapes. Each habitat type is recognized by distinctive combinations of overstory and understory plant species at climax. Habitat types are named for dominant, or characteristic, vegetation of the climax community. The habitat type and phase displayed in this table is documented in *Forest Habitat Types of Montana* (Pfister et al, 1977) for coniferous forests or *Classification and Management of Montana's Riparian and Wetland Sites* (Hansen et al., 1995) for deciduous forests.

Total annual production for rangeland is the amount of vegetation that can be expected to grow annually on well-managed rangeland that is supporting the HCPC. The composition and production of the plant community are determined by soil, climate, topography, and hydrology. Over time, the combination of plants best suited to a particular soil, climate, topography and hydrology results. This group of plants reflects the climax plant community for the site. The HCPC is that assemblage of plants presumed to occur on the site at the time of European immigration and settlement of North American rangelands—a healthy stable site. Natural plant communities are not static but vary slightly from year to year and place to place.

Annual production includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruit of woody plants up to a height of 4.5 feet. Annual production does not include increase in stem diameter of trees and shrubs.

Total annual production is expressed as the total annual yield per acre of air-dry vegetation. The relationship of green weight to air-dry weight varies according to such factors as exposure, amount of shade, recent rains, and unseasonable dry periods. Annual production in this table is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount

and distribution of precipitation, along with temperature, make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

The composition and production of the plant community present on an ecological site today may vary significantly as compared to the HCPC.

Annual production for grazeable forest understory is the amount of annual production of understory plants expected under a canopy density most nearly typical of forestland in which the production of wood crops is highest. The combination of plants and vegetative production actually growing on an individual site must be determined in order to properly stock and determine viable management objectives. The quantity and quality of understory vegetation vary with the kind of soil, age and kind of trees in the canopy, density of the canopy, and depth and condition of the litter, and plant species present.

## Rangeland Management

According to the *National Range and Pasture Handbook* (http://www.glti.nrcs.usda.gov/technical/publications/nrph.html), the objective in grazing land management is to provide the kind of plant community that provides for and maintains a healthy ecosystem, produces quality forage for the grazing animals, and meets the needs of the grazing land enterprise and the desires of the landowner.

Proper grazing management generally results in the optimum production of vegetation, reduction of less desirable species, conservation of water, and control of erosion. Many times a similarity to HCPC somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Rangeland landscapes are divided into ecological sites for the purposes of inventory, evaluation, and management. An ecological site is recognized and described based on the characteristics differentiating it from other sites in its ability to produce and support a characteristic plant community. Rangeland management requires knowledge of ecological sites and of the HCPC.

Disturbances that alter the natural plant community include repeated overuse by livestock, excessive burning, erosion, and plowing. Grazing animals select the most palatable plants within a community. These plants will eventually die if they are continually overgrazed. A severe disturbance can destroy the natural community. Under these conditions, less desirable plants, such as annuals and weeds, can invade. If the plant community has not deteriorated significantly and proper grazing management is applied, it can eventually return to dominantly natural plants.

Knowledge of ecological sites and associated HCPCs is necessary as a basis for planning and applying the management needed to maintain or improve the desired plant community. Such information is needed to determine management objectives, proper grazing systems and stocking rates, suitable wildlife management practices, potential for recreational uses, and condition of watersheds.

Grazing management is the most important part of any rangeland management program. The key elements of grazing management are to manage kind of animals, number of animals, grazing distribution, length of grazing periods, and timing of use. The goal is to provide sufficient deferment from grazing during the growing season to maintain or improve the plant community.

Special consideration is often required for sensitive areas, such as riparian areas, wetlands, and habitats of concern, in order to manage grazing and maintain adequate cover. Misuse of sensitive areas may result in deterioration of protective vegetation, reduction of streambank stability, and excessive erosion. Developing off-stream watering locations can successfully prevent cattle from overgrazing riparian areas and encourage better livestock distribution.

Certain practices commonly are needed to obtain a uniform distribution of grazing. These practices include developing livestock watering facilities, fencing, properly locating salt and mineral supplements, constructing livestock trails in steeply sloping areas, and riding or herding.

Various kinds of grazing systems can be used in range management. No single grazing system is best under all conditions. The grazing system should increase the quantity and quality of range vegetation; meet operators' needs; and be designed according to topography, type of grazing animals, and resource management objectives.

Accelerating practices are applicable in areas where management practices alone do not achieve the desired results in a timely fashion. These practices include range seeding, brush management, weed control, prescribed burning, and mechanical treatment. Accelerating practices can be effective only when used in combination with a management system to help maintain the desired plant community.

Some soils are suited to mechanical treatment for range improvement. On other soils, however, mechanical treatment is not recommended. The "Agronomy" section defines capability classes. Capability classes are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. Many soils in capability classes 1 through 4 are suited to such practices as seeding, mechanical brush and weed control, and water spreading. Soils in capability classes 5, 6, 7, or 8 have greater, and, in some cases, insurmountable limitations. Many soils in capability classes 1 through 4 are suited to tillage for seedbed preparation before native or introduced forage plant species are seeded. Soils in capability class 6 may be suited to limited surface disturbance, such as scarification for seeding and as a means of increasing the rate of water infiltration for seed germination.

### Grazeable Forest Understory Management

Understory vegetation consists of grasses, forbs, shrubs, and other plants. If well managed, some forestland can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the overstory community.

Forest understory production can usually be improved by reducing canopy density when combined with managing grazing stocking rates, livestock distribution, and season of use. Often both woodland and range resources benefit from thinning the overstory to canopy levels that optimize both timber and forage production. Broadcast seeding of disturbed areas soon after timber harvest with desirable range forage species can improve vegetation quantity and quality while reducing the chance of undesirable plants occupying the site.

Steepness of slopes and distance to drinking water are severe grazing management problems in many mountain and foothill areas. Variations in primary season of plant growth, production levels, and plant communities because of elevation and aspect changes present additional challenges. Long, steep slopes limit access by livestock. Less sloping areas are subject to overuse. Grazing should be delayed until the soil is firm enough to withstand trampling and plants have matured enough to withstand grazing pressure.

Habitat type variations as they occur on the landscape illustrate the combined effect of aspect, slope, elevation, and soil properties on potential plant growth.

## Forestland Management and Productivity

The tables described in this section can help forest owners or managers plan the use of soils for wood crops. They show the potential forest productivity of the soils and rate the soils according to limitations affecting various aspects of forestland management.

## Forestland Management

In these tables, interpretive ratings are given for various aspects of forestland management. Ratings in the tables are in both text and numerical format.

Some rating class terms indicate the degree to which the soils are suited to a specified aspect of forestland management. Well suited indicates the soil has features favorable for the specified management aspect and has no limitations. Good performance can be expected, and little or no maintenance is needed. Moderately suited indicates the soil has features moderately favorable for the specified management aspect. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. Poorly suited indicates the soil has one or more properties unfavorable for the specified management aspect. Overcoming unfavorable properties requires special design, extra maintenance, and costly alteration. Unsuited indicates expected performance of the soil is unacceptable for the specified management aspect or that extreme measures are needed to overcome undesirable soil properties.

The paragraphs that follow indicate soil properties considered in rating the soils. Detailed information about criteria used in the ratings can be found in the National Forestry Manual, which is available in local offices of the Natural Resources Conservation Service or on the Internet (http://soils.usda.gov/technical/nfmanual/).

The “Haul Roads, Log Landings, and Seedling Mortality on Forestland” table shows interpretive ratings related to limitations affecting construction of haul roads and log landings, suitability for log landings, and potential for seedling mortality.

For limitations affecting construction of haul roads and log landings, ratings are based on slope, flooding, permafrost, plasticity index, hazard of soil slippage, content of sand, Unified classification, rock fragments on or below the surface, depth to a restrictive layer that is indurated, depth to a water table, and ponding. The limitations are described as slight, moderate, or severe. A rating of slight indicates no significant limitations affect construction activities; moderate indicates one or more limitations can cause some difficulty in construction; and severe indicates one or more limitations can make construction very difficult or very costly.

The ratings of suitability for log landings are based on slope, rock fragments on the surface, plasticity index, content of sand, Unified classification, depth to a water table, ponding, flooding, and hazard of soil slippage. The soils are described as well suited, moderately suited, or poorly suited for use as log landings.

Ratings in the column susceptibility to seedling mortality are based on flooding, ponding, depth to a water table, content of lime, reaction, salinity, available water capacity, soil moisture regime, soil temperature regime, aspect, and slope. The soils are described as having a low, moderate, or high susceptibility to seedling mortality. Where these terms are used, the numerical ratings indicate gradations between the point where susceptibility is highest (1.00) and the point where susceptibility is lowest (0.00).

The “Forestland Planting and Harvesting” table shows interpretive ratings related to suitability for hand planting, suitability for mechanical planting, and suitability for use of harvesting equipment.

Ratings in the columns suitability for hand planting and suitability for mechanical planting are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, moderately suited, poorly suited, or unsuited to these methods of planting. It is assumed necessary site preparation is completed before seedlings are planted.

Ratings in the column suitability for use of harvesting equipment are based on slope, rock fragments on the surface, plasticity index, content of sand, Unified classification, depth to a water table, and ponding. The soils are described as well suited, moderately suited, or poorly suited to this use.

The “Forestland Site Preparation” table shows interpretive ratings related to suitability for mechanical site preparation (surface) and suitability for mechanical site preparation (deep).

Ratings in the column suitability for mechanical site preparation (surface) are based on slope, depth to a restrictive layer, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 1 foot is considered in the ratings.

Ratings in the column suitability for mechanical site preparation (deep) are based on slope, depth to a restrictive layer, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 3 feet is considered in the ratings.

### Forestland Productivity

In the “Forestland Productivity” table, the potential productivity of merchantable or common trees on a soil is expressed as a site index and as a volume number.

Common trees are those that forest managers generally favor in intermediate or improvement cuttings. They are selected based on growth rate, quality, value, and marketability.

The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. The specified number of years (base age) may be different for different species. The site index base age is 30 years for narrowleaf cottonwood (locally adapted site index curves developed by NRCS); 50 years for black cottonwood (Sauerwein, 1979), Douglas-fir (Brickell, 1968), and Engelmann spruce; 80 years for quaking aspen (Baker, 1925); and 100 years for lodgepole pine (Alexander, 1966). Therefore, site index values are not directly comparable from one species to another.

Detailed information regarding site index is available in the National Forestry Manual, which is available in local offices of the Natural Resources Conservation Service or on the Internet (http://soils.usda.gov/technical/nfmanual/).

The volume of wood fiber, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand. These volume numbers are comparable between tree species on a site, or between sites.

Board-foot volumes used to estimate the board foot yields of lodgepole pine (Myers, 1967) are based on Scribner’s log rule. Board-foot volumes include all trees larger than 10 inches in diameter breast height to an 8-inch top diameter inside bark. Total cubic foot yield estimates (inside bark) are based on all trees with diameter breast height inside the bark of more than one inch (Dahms, 1964). Total cubic-foot volume estimates for quaking aspen yields are based on all trees with more than 4 inches diameter breast height (Baker, 1925). Narrowleaf and black cottonwood yields are based on data collected by NRCS.

*Suggested trees to plant* are those preferred for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

## Recreation

In the table, “Camp Areas, Paths and Trails, and Off-road Vehicle Trails,” described in this section, the soils of the survey area are rated according to limitations that affect their suitability for recreational development. Ratings in the table are in both text and numerical format. Rating class terms indicate the extent to which the soils are limited

by all of the soil features that affect the recreational uses. *Not limited* indicates the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

The ratings in the table are based on restrictive soil features, such as wetness, slope, texture of the surface layer, and susceptibility to flooding. Not considered in the ratings, but important in evaluating a site, are the area's location and accessibility, size and shape, and scenic quality; vegetation; access to water and public sewer lines; and potential water impoundment sites. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of depth, duration, intensity, and frequency of flooding is essential.

The information in the "Camp Areas, Paths and Trails, and Off-road Vehicle Trails" table can be supplemented by other information in this survey, for example, interpretations for home and building site development and construction material potential.

*Camp areas* require site preparation, such as shaping and leveling tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. Soil properties that affect performance of the areas after development are those that influence trafficability and promote growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

*Paths and trails* for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

*Off-road vehicle trails* require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

## Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

## Elements of Wildlife Habitat

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are **cor**n, wheat, oats, and barley.

Pasture, grasses, and legumes include domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of these grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are blue grama, goldenrod, purple prairie clover, western wheatgrass, and yarrow.

Deciduous trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of deciduous trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of deciduous trees and woody understory are boxelder, green ash, mountain maple, and snowberry. Examples of fruit-producing trees and shrubs that are suitable for planting on soils that have good potential for these plants are bur oak, chokecherry, and Nanking cherry.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Native shrubs include bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are mountain mahogany, bitterbrush, snowberry, and big sagebrush.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, field mint, cordgrass, rushes, and sedges.

Shallow-water areas have an average depth of less than 3 feet. Some areas are naturally wet. Other areas are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow-water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

## Kinds of Wildlife Habitat

Habitat for openland wildlife consists of cropland, meadows, pasture, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to openland areas include Hungarian partridge, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of coniferous and/or deciduous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to

woodland areas include wild turkey, ruffed grouse, thrushes, woodpeckers, squirrels, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow-water areas. Wildlife attracted to wetlands include ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include antelope, deer, sage grouse, meadowlark, and lark bunting.

### Wildlife of the Flathead County Area and Part of Lincoln County

Habitat quality and interspersion determine wildlife population levels. Suitability of a particular habitat for a wildlife species depends greatly on the nature of the plant communities present. Prevailing land-use practices and management determine the quantity, quality, and distribution of plant communities. These factors are governed to some extent by the soils of the area.

Rating soils for their ability to produce vegetative elements for wildlife habitat does not take into account local climatic influences, present use of soils, juxtaposition of habitat types or elements, or present distribution of wildlife species. For these reasons, the selection and suitability of an area for wildlife habitat development require onsite evaluation.

The soil survey area has a diverse landscape that offers a wide range of wildlife habitat. Game birds include sharp-tailed grouse in the few remaining grasslands and blue, ruffed, and spruce grouse in the forested habitat. Elk, mule deer, and white-tailed deer are common throughout the area. Grizzly and black bears, mountain lions, Canada lynx, and gray wolves frequent both counties. A wide variety of nongame birds and mammals live in the diverse habitats present. Examples include the American redstart and long-tailed weasel.

## Engineering

This section provides information for planning land uses related to urban development and water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading "Soil Properties."

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to soil between the surface and a depth of 5 to 7 feet. Because of map scale, small areas of different soils may be included within mapped areas of a specific soil.

*The information is not site specific and does not eliminate the need for onsite investigation of soils or for testing and analysis by personnel experienced in design and construction of engineering works.*

*Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, site selection, and design.*

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the soil survey fieldwork, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure

aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, reclamation material, roadfill, and topsoil; plan structures for water management; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

Information in the tables, along with the soil maps, soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some terms used in this soil survey have a special meaning in soil science; these terms are defined in the “Glossary.”

## Building Site Development

Soil properties influence the development of building sites, including selection of the site, design of the structure, construction, performance after construction, and maintenance. The “Home and Building Site Development” table shows the degree and kind of soil limitations that affect septic tank absorption fields, dwellings with basements, and dwellings without basements.

Ratings in the table are in both text and numerical format. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

*Septic tank absorption fields* are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches or between a depth of 24 inches and a restrictive layer is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Saturated hydraulic conductivity (Ksat), depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils, the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

*Dwellings* are single-family houses of three stories or less. For *dwellings with basements*, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. For *dwellings without basements*, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum

frost penetration, whichever is deeper. The ratings for dwellings are based on soil properties that affect the capacity of the soil to support a load without movement and on properties that affect excavation and construction costs. Properties that affect load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. Properties that affect ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and amount and size of rock fragments.

## Agricultural Waste Management

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

The tables described in this section show the degree and kind of soil limitations affecting treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. In the context of these tables, effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Food-processing wastewater results from preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places, it is high in content of sodium and chloride. Domestic and food-processing wastewater is very dilute, and effluent from facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; content of nitrogen commonly ranges from 10 to 30 milligrams per liter. Wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the tables are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops (application of manure and food-processing, application of sewage sludge, and disposal of wastewater by irrigation) and for waste management systems designed only for the purpose of wastewater disposal and treatment (overland flow of wastewater).

The ratings in the tables are in both text and numerical format. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates the soil has features that are moderately favorable for the specified use. Limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

The “Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge” table shows interpretive ratings related to application of manure, food-processing waste, and sewage sludge.

*Application of manure and food-processing waste* not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in soils where the material is applied. Manure is excrement of livestock and poultry,

and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. Manure and food-processing waste are a solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with lye used in food processing, are not considered in the ratings.

The ratings are based on soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which waste is applied, and the method by which waste is applied. Properties that affect absorption include permeability, depth to a water table, ponding, sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. Properties that affect plant growth and microbial activity include reaction, sodium adsorption ratio, salinity, and bulk density. Wind erodibility group, soil erodibility K factor, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder waste application. Permanently frozen soils are unsuitable for waste treatment.

*Application of sewage sludge* not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. Nitrogen content varies. Some sludge has constituents toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is 50 to 90 percent water, and solid if it is less than 50 percent water.

The ratings in the table are based on soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which sludge is applied, and the method by which sludge is applied. Properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. Wind erodibility group, soil erodibility K factor, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder sludge application. Permanently frozen soils are unsuitable for waste treatment.

The “Agricultural Disposal of Wastewater by Irrigation and Overland Flow” table shows interpretive ratings related to disposal of wastewater by irrigation and disposal of wastewater by overland flow.

*Disposal of wastewater by irrigation* not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on soil properties that affect design, construction, management, and performance of the irrigation system. Properties that affect design and management include sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. Properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. Properties that affect performance include depth to bedrock or a cemented pan, bulk density, sodium adsorption ratio, salinity, reaction, and cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

*Disposal of wastewater by overland flow* is a process where wastewater is applied to the upper reaches of sloped land and allowed to flow across vegetated surfaces, sometimes called terraces, to runoff-collection ditches. The length of the run generally is 150 to 300 feet. The application rate ranges from 2.5 to 16.0 inches per week. It commonly exceeds the rate needed for irrigation of cropland. The wastewater leaves a thin film of solids and nutrients on the vegetated surfaces as it flows downslope. Most of the water reaches the collection ditch, some is lost through evapotranspiration, and a small amount may percolate to the ground water.

The ratings in the table are based on soil properties that affect absorption, plant growth, microbial activity, and the design and construction of the system. Reaction and cation-exchange capacity affect absorption. Reaction, salinity, and sodium adsorption ratio affect plant growth and microbial activity. Slope, permeability, depth to a water table, ponding, flooding, depth to bedrock or a cemented pan, stones, and cobbles affect design and construction. Permanently frozen soils are unsuitable for waste treatment.

## Construction Materials

The “Construction Material Potential” table gives information about soils as potential sources of gravel and sand. The “Potential Source of Reclamation Material, Roadfill, and Topsoil” table provides information about soils as potential sources of reclamation material, roadfill, and topsoil. Normal compaction, minor processing, and other standard construction practices are assumed.

*Gravel* and *sand* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the tables, only the likelihood of finding material in suitable quantity is evaluated. The suitability of material for specific purposes is not evaluated, nor are factors that affect excavation of the material. Properties used to evaluate the soil as a source of gravel or sand are gradation of grain sizes (as indicated by the Unified classification of the soil), thickness of suitable material, and content of rock fragments. If the bottom layer of soil contains gravel or sand, the soil is considered a likely source regardless of thickness. The assumption is that the gravel or sand layer below the depth of observation exceeds the minimum thickness.

The soils are rated *good*, *fair*, or *poor* as potential sources of reclamation material, roadfill, and topsoil. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of reclamation material, roadfill, and topsoil. The lower the number is, the lesser the potential is.

*Reclamation material* is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. Ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on soil properties that affect erosion and surface stability, and the productive potential of the reconstructed soil. These properties include content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

*Roadfill* is soil material that is excavated in one place and used in road embankments elsewhere. In this table, soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed soil layers will be mixed when soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and performance of the material after it is in place. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the American Association of State Highway and Transportation Officials (AASHTO) classification of the soil) and linear extensibility (shrink-swell potential) (AASHTO, 2004).

*Topsoil* is used to cover an area so vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. Ratings are based on the soil properties that affect plant growth; ease of excavating, loading, and spreading material; and reclamation of the borrow area. Toxic substances, soil reaction, and properties inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases absorption and retention of moisture and nutrients for plant growth.

## Water Management

The “Ponds and Embankments” table gives information on soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. Ratings in the table are in both text and numerical format. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

*Pond reservoir areas* hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect storage capacity of the reservoir area.

*Embankments, dikes, and levees* are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments with zoned construction (core and shell) are not considered. In this table, soils are rated as a source of material for embankment fill. Ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or

salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

*Aquifer-fed excavated ponds* are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of water as inferred from the salinity of the soil. Depth to bedrock and content of large stones affect the ease of excavation.

# Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many, typically 2-meter deep, excavations are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

## Engineering Index Properties

The “Engineering Index Properties” table described in this section gives the engineering classifications and the range of engineering properties for the layers of each soil component in the survey area.

*Depth* to the upper and lower boundaries of each layer is indicated.

*Texture* is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the “Glossary.”

*Classification* (engineering) of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

*Fragments* larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

*Percentage (of soil particles) passing sieve number* is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

*Liquid limit* and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area, or from nearby areas, and on field examination.

## Physical Properties

The “Physical Properties of the Soils” table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

*Clay* as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In the table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil taxonomic and engineering classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

*Moist bulk density* is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓- or ¹⁄₁₀-bar (33-kPa or 10-kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil is an indication of the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 may restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

*Saturated hydraulic conductivity ($K_{sat}$)* refers to the ease with which pores in a saturated soil transmit water. The estimates in the table are expressed in terms of in micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity ($K_{sat}$) is considered in the design of soil drainage systems and septic tank absorption fields.

*Available water capacity* refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water

per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at ⅓- or 1/10-bar tension (33- or 10-kPa) moisture tension and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the *shrink-swell potential* of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

*Organic matter* is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

*Erosion factors* are shown in the table as the K factor ($K_w$ and $K_f$) and the T factor. Erosion K factor indicates the susceptibility of a soil to sheet and rill erosion by water. K Factor is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values for K range from 0.02 to 0.69. Other factors being equal, the higher the K factor, the more susceptible the soil is to sheet and rill erosion by water.

*Erosion factor $K_w$* indicates the erodibility of the whole soil. The estimates include the presence of rock fragments.

*Erosion factor $K_f$* indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

*Erosion factor T* is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

*Wind erodibility groups* are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the *National Soil Survey Handbook*, which is available in local offices of the Natural Resources Conservation Service or on the Internet (http://soils.usda.gov/technical/handbook/).

*Wind erodibility index* is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and calcium carbonate content. Soil moisture and frozen soil conditions also influence wind erosion.

## Chemical Properties

The “Chemical Properties of the Soils” table shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

*Cation-exchange capacity* is the total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity retain fewer cations, resulting in lower inherent fertility than soils having a high cation-exchange capacity.

*Effective cation-exchange capacity* refers to the sum of exchangeable cations plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

*Soil reaction* is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating fertility requirements, and in determining the risk of corrosion.

*Calcium-carbonate* equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the elevated pH values that result from carbonates in the soil.

*Gypsum* is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

*Salinity* is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C (77 degrees F). Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the management of water application. Hence, the salinity of soils in individual fields can vary from the value given in the table. Salinity affects the suitability of a soil for crop production, revegetation, and the potential of the soil to corrode metal and concrete.

*Sodium adsorption ratio* (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, increased pH values, and a general degradation of soil structure.

## Water Features

The “Water Features” table gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well-drained

soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

*Water table* refers to a saturated zone in the soil. The table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redox features) in the soil.

*Ponding* is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency* of ponding.

*Duration* is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

*Flooding* is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

*Duration* and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to less than 2 days, *brief* if 2 to less than 7 days, *long* if 7 to less than 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is more than 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based in part on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development. Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods.

Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

## Soil Features

The “Soil Features” table gives estimates of various soil features. The estimates are used in land use planning.

*Restrictions* are nearly continuous layers that have one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

*Subsidence* is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected *initial* subsidence, which usually is a result of drainage, and *total* subsidence, which results from a combination of factors.

*Potential frost action* is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength cause damage to pavements and other rigid structures during periods of thawing.

*Risk of corrosion* pertains to potential soil-related electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is relative to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion.

For uncoated steel and concrete, the risk of corrosion is expressed as *low*, *moderate*, or *high*.

# Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999 and 2003). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Inceptisol, from inceptum, meaning beginning.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udepts (*Ud*, meaning soil with a udic moisture regime, plus *epts*, from Inceptisols).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Eutrudepts (*Eutr*, modified from Greek *eu*, meaning utrophic soils with high base saturation, plus *udepts*, from the suborder of the Inceptisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Vitrandic Eutrudepts.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is loamy-skeletal, mixed, superactive frigid Vitrandic Eutrudepts.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. An example is the Pleasantvalley series. The soils in the Pleasantvalley series are loamy-skeletal, mixed, superactive, frigid Vitrandic Eutrudepts.

The “Taxonomic Classification of the Soils” table indicates the order, suborder, great group, subgroup, and family of the soil series in the survey area.

## Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is included. A pedon description of a three-dimensional area of soil, that is typical of the series in the survey area, is provided. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (Soil Survey Division Staff, 1993) and in the *Field Book for Describing and Sampling Soils* (Schoeneberger and others, 2002). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (Soil Survey Staff, 1999) and in *Keys to Soil Taxonomy* (Soil Survey Staff, 2003). Unless otherwise indicated, colors in the descriptions are for dry soil. A comprehensive description of the official series is available online at http://soils.usda.gov/technical/classification/osd/index.html.

## *Ashleylake Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Vitrandic Glossudalfs

### *Typical Pedon*

Ashleylake cobbly ashy silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; slightly decomposed needles and twigs.

E1—1 to 6 inches; light brownish gray (10YR 6/2) cobbly ashy silt loam, grayish brown (10YR 5/2) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; common fine dendritic tubular pores; 15 percent gravel and 10 percent cobbles; neutral (pH 6.6); clear wavy boundary.

E2—6 to 14 inches; light gray (10YR 7/2) cobbly ashy silt loam, grayish brown (10YR 5/2) moist; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common fine dendritic tubular pores; 15 percent gravel and 10 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

E/Bt—14 to 23 inches; E part (60 percent) is light gray (10YR 7/2) very cobbly silt loam, grayish brown (10YR 5/2) moist; Bt part (40 percent) is light yellowish brown (2.5Y 6/4) very cobbly silty clay loam, light olive brown (2.5Y 5/4) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; common fine dendritic tubular pores; few faint patchy clay films on faces of peds in Bt part; 20 percent gravel, 15 percent cobbles, and 5 percent stones; slightly acid (pH 6.4); gradual wavy boundary.

Bt/E—23 to 30 inches; Bt part (70 percent) is light yellowish brown (2.5Y 6/4) very cobbly silty clay loam, light olive brown (2.5Y 5/4) moist; E part (30 percent) is light gray (10YR 7/2) very cobbly silt loam, grayish brown (10YR 5/2) moist; moderate medium and coarse subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common very fine, fine, medium, and coarse roots; common fine dendritic tubular pores; few faint patchy clay films on faces of peds in Bt part; 20 percent gravel, 15 percent cobbles, and 5 percent stones; slightly acid (pH 6.4); clear wavy boundary.

Bt—30 to 40 inches; light yellowish brown (2.5Y 6/4) very cobbly silty clay loam, light olive brown (2.5Y 5/4) moist; strong medium and coarse subangular blocky structure parting to strong fine subangular blocky; hard, firm, moderately sticky and moderately plastic; common very fine, fine, medium, and coarse roots; few fine dendritic tubular pores; common distinct discontinuous clay films on faces of peds; 25 percent gravel, 15 percent cobbles, and 5 percent stones; slightly alkaline (pH 7.4); clear wavy boundary.

Bk—40 to 60 inches; pale yellow (2.5Y 7/4) very cobbly silt loam, light yellowish brown (2.5Y 6/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; few fine dendritic tubular pores; disseminated lime, many distinct coats of lime on undersides of rock fragments; violently effervescent; 25 percent gravel, 15 percent cobbles, and 5 percent stones; moderately alkaline (pH 8.0).

## *Auggie Series*

**Taxonomic Class:** Fine-silty, mixed, active Eutric Glossocryalfs

### *Typical Pedon*

Auggie silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.
E—2 to 10 inches; very pale brown (10YR 8/2) silt loam, light brownish gray (10YR 6/2) moist; weak very fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; common fine dendritic tubular pores; moderately acid (pH 5.8); clear smooth boundary.
Bt/E1—10 to 18 inches; B part (60 percent) is very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; E part (40 percent) is very pale brown (10YR 8/2) silt loam, light brownish gray (10YR 6/2) moist; moderate coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; common fine dendritic tubular pores; few faint clay films on faces of peds; slightly acid (pH 6.4); gradual smooth boundary.
Bt/E2—18 to 30 inches; B part (80 percent) is pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; E part (20 percent) is very pale brown (10YR 8/2) silt loam, light brownish gray (10YR 6/2) moist; moderate coarse subangular blocky structure; hard, friable, moderately sticky and moderately plastic; common very fine roots; common fine dendritic tubular pores; common distinct clay films on faces of peds and in pores; slightly acid (pH 6.4); gradual smooth boundary.
Bt—30 to 50 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist; moderate coarse subangular blocky structure; hard, friable, moderately sticky and moderately plastic; few very fine roots; few fine dendritic tubular pores; common distinct clay films on faces of peds and in pores; slightly acid (pH 6.4); clear smooth boundary.
C1—50 to 54 inches; very pale brown (10YR 7/3) very fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine tubular pores; neutral (pH 7.0); clear smooth boundary.
C2—54 to 60 inches; very pale brown (10YR 8/2) and very pale brown (10YR 7/3) varved silt loams, light brownish gray (10YR 6/2) and brown (10YR 5/3) moist; moderate medium platy lacustrine sediments; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; disseminated lime; slightly effervescent; slightly alkaline (pH 7.6).

## *Barzee Series*

**Taxonomic Class:** Euic, frigid Typic Haplohemists

### *Typical Pedon*

Barzee mucky peat (Colors are for moist soil unless otherwise noted.)

Oi—0 to 4 inches; very dark brown (10YR 2/1) broken face and rubbed mucky peat (fibric material); about 90 percent fiber and raw herbaceous plant material, about

70 percent rubbed; massive; nonsticky and nonplastic; 80 percent Lycopodium mosses and 20 percent herbaceous; many very fine and fine roots; moderately acid (pH 5.8); clear smooth boundary.
Oe1—4 to 25 inches; black (10YR 2/1) broken face and rubbed mucky peat (hemic material); about 60 percent fiber, about 25 percent rubbed; massive; nonsticky and nonplastic; 90 percent Lycopodium mosses and 10 percent herbaceous; many very fine and fine roots; moderately acid (pH 6.0); clear wavy boundary.
Oe2—25 to 55 inches; stratified (0.5 to 3.0 inches) black (10YR 2/1) broken face mucky peat and very dark brown (10YR 2/2) broken face peat (stratified hemic (80 percent) and fibric (20 percent) material); black (10YR 2/1) rubbed and pressed, about 40 percent fiber, about 20 percent rubbed; massive; nonsticky and nonplastic; 80 percent Lycopodium mosses and 20 percent herbaceous; many very fine roots; moderately acid (pH 6.0); gradual wavy boundary.
Oe3—55 to 60 inches; black (10YR 2/1) broken face and rubbed mucky peat (hemic material); about 40 percent fiber, about 20 percent rubbed; massive; nonsticky and nonplastic; 90 percent herbaceous and 10 percent Lycopodium mosses; many very fine roots; moderately acid (pH 6.0).

## *Bata Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Andic Glossocryalfs

### *Typical Pedon*

Bata gravelly ashy silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed and slightly decomposed forest litter.
Bw—1 to 10 inches; light yellowish brown (10YR 6/4) gravelly ashy silt loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; many fine and medium roots; many very fine tubular pores; 20 percent gravel; moderately acid (pH 5.8); abrupt wavy boundary.
2E/Bt—10 to 24 inches; E part (70 percent) is pinkish gray (7.5YR 7/2) gravelly loam, brown (7.5YR 5/2) moist; B part (30 percent) is pink (7.5YR 7/4) gravelly loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium and few coarse roots; many very fine and common fine irregular pores; common distinct clay films on faces of peds; 25 percent gravel; moderately acid (pH 6.1); gradual wavy boundary.
2Bt—24 to 60 inches; pink (7.5YR 7/4) very gravelly clay loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few medium and coarse roots; few very fine tubular pores; common distinct clay films on faces of peds; 40 percent gravel and 10 percent cobbles; moderately acid (pH 6.1).

## *Battlebutte Series*

**Taxonomic Class:** Loamy, mixed, active, frigid, shallow Typic Haploxerolls

### *Typical Pedon*

Battlebutte gravelly loam (Colors are for dry soil unless otherwise noted.)

A1—0 to 2 inches; dark gray (10YR 4/1) gravelly loam, very dark gray (10YR 3/1) moist; weak medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine and few medium and coarse roots; common very fine tubular pores; 20 percent gravel; neutral (pH 6.8); clear smooth boundary.

A2—2 to 8 inches; dark gray (10YR 4/1) gravelly loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine and few medium and coarse roots; common very fine tubular pores; 20 percent gravel; neutral (pH 6.8); clear smooth boundary.
Bw1—8 to 13 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; common very fine tubular pores; 10 percent paragravel and 20 percent gravel; neutral (pH 6.8); clear smooth boundary.
Bw2—13 to 19 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist, massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; 50 percent paragravel and 20 percent gravel; neutral (pH 6.6); gradual smooth boundary.
Cr—19 inches; semiconsolidated welded tuff.

## *Bendahl Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Andic Eutrudepts

### *Typical Pedon*

Bendahl gravelly ashy silt loam (Colors are for moist soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed and slightly decomposed forest litter.
A—1 to 2 inches; brown (10YR 4/3) gravelly ashy silt loam, brown (10YR 5/3) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and medium and few coarse roots; 20 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary.
Bw—2 to 8 inches; dark yellowish brown (10YR 4/4) gravelly ashy silt loam, light yellowish brown (10YR 6/4) dry; weak fine and medium subangular blocky structure parting to moderate fine and medium granular; soft, very friable, nonsticky and nonplastic; many fine and medium and few coarse roots; 20 percent gravel; slightly acid (pH 6.4); clear wavy boundary.
2E—8 to 18 inches; pale brown (10YR 6/3) very gravelly loam, light gray (10YR 7/2) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and common medium roots; 35 percent gravel and 5 percent cobbles; neutral (pH 6.8); gradual wavy boundary.
2E/Bw—18 to 28 inches; E part (60 percent) is pale brown (10YR 6/3) very gravelly loam, light gray (10YR 7/2) dry; B part (40 percent) is yellowish brown (10YR 5/4) very gravelly loam, pale brown (10YR 6/3) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and common medium roots; 40 percent gravel and 5 percent cobbles; slightly alkaline (pH 7.6); gradual wavy boundary.
2Bk1—28 to 39 inches; light brownish gray (10YR 6/2) very gravelly loam, very pale brown (10YR 8/2) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium and few coarse roots; 35 percent gravel and 10 percent cobbles; disseminated lime, common distinct coats of lime on undersides of rock fragments; violently effervescent; moderately alkaline (pH 8.2); gradual wavy boundary.
2Bk2—39 to 60 inches; light brownish gray (10YR 6/2) very cobbly loam, very pale brown (10YR 8/2) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; 35 percent gravel and 20 percent cobbles; disseminated lime, many distinct coats of lime on undersides of rock fragments; violently effervescent; moderately alkaline (pH 8.2).

## *Bigarm Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Haploxerolls

### *Typical Pedon*

Bigarm very gravelly loam (Colors are for dry soil unless otherwise noted.)

A—0 to 12 inches; dark grayish brown (10YR 4/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 45 percent angular gravel; neutral (pH 6.7); gradual wavy boundary.

Bw—12 to 18 inches; brown (10YR 5/3) very gravelly loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common very fine and fine roots; common very fine and fine pores; 50 percent angular gravel; neutral (pH 7.0); gradual wavy boundary.

BC—18 to 38 inches; very pale brown (10YR 7/3) very gravelly fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots in upper part; 50 percent angular gravel; neutral (pH 7.0); gradual wavy boundary.

C—38 to 60 inches; very pale brown (10YR 7/3) extremely gravelly sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; 55 percent angular gravel, 10 percent angular cobbles; neutral (pH 7.2).

## *Bigdraw Series*

**Taxonomic Class:** Fine-loamy, mixed, active, frigid Typic Argixerolls

### *Typical Pedon*

Bigdraw gravelly loam (Colors are for dry soil unless otherwise noted.)

A1—0 to 3 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; 25 percent gravel; neutral (pH 6.8); clear smooth boundary.

A2—3 to 9 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; common very fine tubular pores; 25 percent gravel; slightly acid (pH 6.4); clear smooth boundary.

Bt1—9 to 15 inches; pale brown (10YR 6/3) gravelly clay loam, brown (10YR 4/3) moist; moderate fine and medium angular blocky structure; slightly hard, friable, moderately sticky and moderately plastic; common very fine and fine and few medium roots; common very fine and fine tubular pores; common prominent clay films on faces of peds and in pores; 15 percent gravel and 5 percent cobbles; neutral (pH 7.2); clear smooth boundary.

Bt2—15 to 20 inches; light yellowish brown (10YR 6/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; strong fine and medium subangular blocky structure; slightly hard, friable, moderately sticky and moderately plastic; common fine roots; common very fine and fine tubular pores; few faint clay films on faces of peds; 20 percent paragravel and 15 percent gravel; slightly effervescent, slightly alkaline (pH 7.4); clear smooth boundary.

Bk—20 to 28 inches; very pale brown (10YR 7/3) very paragravelly coarse sandy loam, pale brown (10YR 6/3) moist; massive; soft, very friable, slightly sticky and

nonplastic; few fine roots; 45 percent paragravel and 10 percent gravel; strongly effervescent, common seams and soft masses of lime; moderately alkaline (pH 8.2); gradual smooth boundary.
Cr—28 inches; semiconsolidated welded tuff.

## *Biglake Series*

**Taxonomic Class:** Sandy--skeletal, mixed, frigid Typic Haploxerolls

### *Typical Pedon*

Biglake gravelly loam (Colors are for dry soil unless otherwise noted.)

A—0 to 9 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine, fine, and medium and few coarse roots; 20 percent gravel; neutral (pH 7.0); clear wavy boundary.
Bw—9 to 20 inches; brown (10YR 5/3) very cobbly sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium and few coarse roots; 30 percent gravel and 20 percent cobbles; neutral (pH 7.0); clear wavy boundary.
C—20 to 60 inches; pale brown (10YR 6/3) extremely gravelly loamy sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; common very fine and fine roots; 50 percent gravel and 20 percent cobbles; neutral (pH 7.0).

## *Blackcreek Series*

**Taxonomic Class:** Coarse-silty, mixed, superactive, calcareous, frigid Typic Endoaquepts

### *Typical Pedon*

Blackcreek silt loam (Colors are for moist soil unless otherwise noted.)

A—0 to 4 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium and few coarse roots; neutral (pH 7.2); clear wavy boundary.
Bw—4 to 10 inches; dark gray (10YR 4/1) silt, gray (10YR 6/1) dry; moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; neutral (pH 7.2); gradual wavy boundary.
Bk—10 to 27 inches; olive gray (5Y 5/2) silt loam, light gray (5Y 7/2) dry; weak medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; few medium roots; few fine faint brown (10YR 4/3) redox concentrations, moist; few fine masses of lime; slightly effervescent; slightly alkaline (pH 7.8); gradual wavy boundary.
C1—27 to 36 inches; gray (5Y 6/1) silt, white (5Y 8/1) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine distinct brown (10YR 4/3) redox concentrations, moist; slightly effervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
C2—36 to 42 inches; light gray (5Y 7/2) silt, pale yellow (5Y 8/2) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; many prominent medium yellowish brown (10YR 5/6) redox concentrations, moist; neutral (pH 6.8); gradual wavy boundary.
2C3—42 to 60 inches; gray (10YR 5/1) stratified loamy coarse sand and silt, gray (10YR 6/1) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; slightly acid (pH 6.3).

## Blacklake Series

**Taxonomic Class:** Coarse-silty, mixed, superactive, nonacid, frigid Histic Humaquepts

### Typical Pedon

Blacklake mucky peat (Colors are for moist soil unless otherwise noted.)

Oe—0 to 9 inches; very dark brown (10YR 2/2) broken face and rubbed mucky peat (hemic material), about 70 percent fiber and raw herbaceous material, about 30 percent rubbed; weak thin platy structure parting to weak fine granular; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots; moderately acid (pH 5.8); clear smooth boundary.

Oe/C—9 to 14 inches; stratified black (10YR 2/1) broken face and rubbed mucky peat (hemic material), about 80 percent fiber and raw herbaceous material, about 30 percent rubbed (80 percent) and very dark gray (10YR 3/1) mucky silt loam (20 percent); moderate thin platy structure parting to moderate fine granular; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots; moderately acid (pH 5.8); abrupt wavy boundary.

C/Oa—14 to 31 inches; stratified very dark grayish brown (10YR 3/2) mucky silt loam (70 percent), dark gray (10YR 4/1) silt loam (20 percent) and black (10YR 2/1) muck (10 percent); weak medium subangular blocky structure parting to weak very fine granular; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; moderately acid (pH 5.8); clear wavy boundary.

C—31 to 57 inches; stratified light brownish gray (10YR 6/2) very fine sandy loam and silt loam (70 percent) and light gray (10YR 7/2) silt (30 percent); massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; moderately acid (pH 6.0); abrupt wavy boundary.

C/Oa'—57 to 60 inches; stratified very dark gray (10YR 3/1) mucky silt loam (80 percent) and black (10YR 2/1) muck (20 percent); massive; slightly hard, friable, slightly sticky and slightly plastic; moderately acid (pH 6.0).

## Bowlake Series

**Taxonomic Class:** Fine, illitic, frigid Calcic Argixerolls

### Typical Pedon

Bowlake gravelly loam (Colors are for dry soil unless otherwise noted.)

Ap—0 to 11 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; soft, friable, slightly sticky and slightly plastic; many fine and medium roots; common fine pores; 10 percent gravel and 5 percent cobbles; neutral (pH 7.0); clear smooth boundary.

Bt/E—11 to 19 inches; B part (70 percent) is light brown (7.5YR 6/3) gravelly silty clay, brown (7.5YR 4/4) moist; E part (30 percent) is pinkish gray (7.5YR 7/2) gravelly silty clay loam, brown (7.5YR 5/2) moist; color mixed is brown (7.5YR 5/4) moist; gravelly silty clay loam; moderate fine and medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; few coarse and common fine roots; many fine tubular pores; 10 percent gravel and 5 percent cobbles; slightly alkaline (pH 7.4); clear smooth boundary.

Bt1—19 to 26 inches; light brown (7.5YR 6/4) gravelly clay, brown (7.5YR 5/4) moist; weak medium prismatic structure parting to strong medium subangular blocky; hard, firm, moderately sticky and moderately plastic; common fine and few coarse roots; many fine tubular pores; common prominent clay films on faces of peds;

10 percent gravel and 5 percent cobbles; slightly alkaline (pH 7.6); clear smooth boundary.

Bt2—26 to 32 inches; light brown (7.5YR 6/4) gravelly clay, brown (7.5YR 5/4) moist; moderate fine and medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common fine roots; many fine tubular pores; continuous distinct clay films in tubular pores and on faces of peds; 10 percent gravel and 5 percent cobbles; slightly alkaline (pH 7.8); clear wavy boundary.

Bk—32 to 51 inches; pink (7.5YR 7/4) gravelly clay, brown (7.5YR 5/4) moist; weak fine and medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; few fine roots; many fine tubular pores; 10 percent gravel and 5 percent cobbles; common fine masses and threads of lime; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.

C—51 to 60 inches; light brown (7.5YR 6/4) gravelly sandy clay loam, strong brown (7.5YR 5/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; very few fine roots; few fine tubular pores; 15 percent gravel and 5 percent cobbles; slightly effervescent; moderately alkaline (pH 8.0).

## *Camascreek Series*

**Taxonomic Class:** Fine, mixed, superactive, frigid Aquic Natrixerolls

### *Typical Pedon*

Camascreek silt loam (Colors are for dry soil unless otherwise noted.)

A1—0 to 8 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; moderate medium platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and common medium roots; many very fine and fine pores; strongly effervescent, disseminated lime; very strongly alkaline (pH 9.2); clear smooth boundary.

A2—8 to 15 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to strong very fine and fine angular blocky; slightly hard, firm, slightly sticky and moderately plastic; common fine and medium and few coarse roots; few very fine pores; violently effervescent, disseminated lime; strongly alkaline (pH 8.8); clear smooth boundary.

Btkn1—15 to 23 inches; pale brown (10YR 6/3) silty clay, brown (10YR 4/3) moist; weak medium prismatic structure parting to strong fine and medium angular and subangular blocky; very hard, very firm, moderately sticky and very plastic; few fine roots; common very fine and fine pores; common distinct clay films on faces of peds and in pores; strongly effervescent, common fine soft masses of lime; moderately alkaline (pH 8.4); gradual smooth boundary.

Btkn2—23 to 43 inches; pale brown (10YR 6/3) silty clay, brown (10YR 4/3) moist; common faint grayish brown (2.5Y 5/2) redox depletions; weak medium and coarse subangular blocky structure; hard, very firm, moderately sticky and very plastic; few fine roots; common fine and medium pores; few distinct clay films on faces of peds; strongly effervescent, many fine soft masses of lime; moderately alkaline (pH 8.2); gradual smooth boundary.

BC—43 to 60 inches; light yellowish brown (10YR 6/4) silty clay, dark yellowish brown (10YR 4/4) moist; common distinct grayish brown (2.5Y 5/2) redox depletions; massive; very hard, very firm, moderately sticky and very plastic; few fine pores; slightly effervescent, disseminated lime; moderately alkaline (pH 8.0).

## *Castner Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lithic Haplustolls

### *Typical Pedon*

Castner gravelly silt loam (Colors are for dry soil unless otherwise noted.)

A1—0 to 8 inches; very dark gray (10YR 3/1) gravelly silt loam, very dark brown (10YR 2/2) moist; weak medium granular structure; friable, slightly hard, nonsticky and nonplastic; many fine roots, many fine and medium pores; 20 percent gravel; noneffervescent; neutral (pH 7.2); gradual smooth boundary.
A2—8 to 14 inches; dark gray (10YR 4/1), gravelly silt loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; friable, slightly hard, nonsticky and nonplastic; many very fine and fine roots and pores; 20 percent gravel; noneffervescent; slightly alkaline (pH 7.6); clear smooth boundary.
Bk—14 to 19 inches; light brownish gray (2.5Y 6/2), very gravelly silt loam, light olive brown (2.5Y 5/3) moist; weak fine and medium subangular blocky structure; friable, slightly hard, nonsticky and nonplastic; many very fine and fine roots with a root mat at depth of 16 inches; common very fine and fine pores; 25 percent gravel and 10 percent cobbles; violently effervescent; moderately alkaline (pH 8.4); abrupt smooth boundary.
R—19 inches; quartzite bedrock.

## *Combest Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Andic Haplustepts

### *Typical Pedon*

Combest gravelly ashy silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.
A—2 to 4 inches; very dark grayish brown (10YR 3/2) gravelly ashy silt loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; many very fine, fine, medium, and coarse roots; volcanic ash component; 20 percent gravel; slightly acid (pH 6.4); clear smooth boundary.
Bw—4 to 12 inches; light yellowish brown (10YR 6/4) gravelly ashy silt loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and slightly plastic; many very fine, fine, medium, and coarse roots; 30 percent gravel; slightly acid (pH 6.4); abrupt wavy boundary.
2E—12 to 26 inches; light gray (10YR 7/2) very gravelly sandy loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; 40 percent gravel and 15 percent cobbles; slightly acid (pH 6.2); gradual wavy boundary.
2E/Bw—26 to 60 inches; E part (80 percent) is light gray (10YR 7/2) extremely cobbly sandy loam, grayish brown (10YR 5/2) moist that surrounds the B part; B part (20 percent) is pale brown (10YR 6/3) extremely cobbly sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; 40 percent gravel and 30 percent cobbles; moderately acid (pH 6.0).

## *Courville Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Andic Eutrudepts

### *Typical Pedon*

Courville gravelly ashy silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed and slightly decomposed needles and twigs.
A—1 to 4 inches; dark grayish brown (10YR 4/2) gravelly ashy silt loam, black (10YR 2/1) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; 30 percent gravel; slightly acid (pH 6.1); clear smooth boundary.
Bw—4 to 14 inches; pale brown (10YR 6/3) gravelly ashy silt loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; 25 percent gravel and 5 percent cobbles; slightly acid (pH 6.2); clear wavy boundary.
2E—14 to 33 inches; very pale brown (10YR 7/3) very gravelly sandy loam, brown (10YR 5/3) moist; massive; soft, nonsticky and nonplastic; 55 percent gravel and 5 percent cobbles; moderately acid (pH 6.0); clear wavy boundary.
2E/Bw—33 to 39 inches; E part (80 percent) is very pale brown (10YR 8/2) very gravelly sandy loam, light brownish gray (10YR 6/2) moist that surrounds the B part; B part (20 percent) is yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; hard, friable, slightly sticky and slightly plastic; 45 percent gravel and 10 percent cobbles; moderately acid (pH 5.6); clear wavy boundary.
2Bw/E—39 to 60 inches; B part (75 percent) is yellowish brown (10YR 5/6) very gravelly sandy loam, dark yellowish brown (10YR 4/6) moist; E part (25 percent) is very pale brown (10YR 8/2) very gravelly sandy loam, light brownish gray (10YR 6/2) moist that surrounds the B part; massive; hard, friable, slightly sticky and slightly plastic; 45 percent gravel and 10 percent cobbles; moderately acid (pH 5.6).

## *Crystalex Series*

**Taxonomic Class:** Coarse-loamy, mixed, superactive, frigid Lamellic Hapludalfs

### *Typical Pedon*

Crystalex loamy coarse sand (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed and slightly decomposed forest litter.
E1—1 to 10 inches; very pale brown (10YR 7/3) loamy coarse sand, brown (10YR 5/3) moist; weak medium platy structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; many fine and medium and few coarse roots; slightly acid (pH 6.2); gradual wavy boundary.
E2—10 to 22 inches; light gray (2.5Y 7/2) loamy coarse sand, grayish brown (2.5Y 5/2) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine and medium and few coarse roots; slightly acid (pH 6.4); gradual wavy boundary.
E and Bt1—22 to 38 inches; E part (80 percent) is light gray (2.5Y 7/2) loamy sand, grayish brown (2.5Y 5/2) moist, Bt part (20 percent) is brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist, broken discontinuous lamellae 1/8- to 1/4-inch thick parting to weak coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine and medium and few coarse roots; few faint clay films on faces of peds; moderately acid (pH 6.0); gradual wavy boundary.
E and Bt2—38 to 60 inches; E part (60 percent) is light gray (2.5Y 7/2) loamy sand, grayish brown (2.5Y 5/2) moist, Bt part (40 percent) is brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist, broken discontinuous lamellae 3/8- to 1/2-inch thick parting to weak coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common medium and few coarse roots; common faint clay films on faces of peds; slightly acid (pH 6.4).

## *Dahlake Series*

**Taxonomic Class:** Fine-silty, mixed, active, calcareous, frigid Aeric Halaquepts

### *Typical Pedon*

Dahlake silt loam (Colors are for moist soil unless otherwise noted.)

A—0 to 8 inches; very dark gray (2.5Y 3/1) silt loam, gray (2.5Y 6/1) dry; weak fine and medium granular structure; hard, firm, nonsticky and nonplastic; many very fine roots; strongly effervescent; strongly alkaline (pH 9.0); clear smooth boundary.

Bw—8 to 19 inches; light brownish gray (2.5Y 6/2) silt loam, light gray (5Y 7/2) dry; moderate medium prismatic structure parting to strong medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few very fine roots; many very fine and fine interstitial and tubular pores; 60 percent distinct grayish brown (2.5Y 5/2) moist organic stains on all faces of peds; strongly effervescent; very strongly alkaline (pH 9.4); gradual smooth boundary.

BC—19 to 27 inches; light yellowish brown (2.5Y 6/3) silt loam, pale yellow (5Y 7/3) dry; moderate coarse prismatic structure parting to strong medium subangular blocky; hard, firm, nonsticky and nonplastic; few fine distinct yellowish brown (10YR 5/6) moist redox concentrations; few fine roots; common very fine and fine interstitial and tubular pores; 40 percent distinct grayish brown (2.5Y 5/2) moist organic stains on all faces of peds; strongly effervescent; very strongly alkaline (pH 9.4); gradual smooth boundary.

C—27 to 60 inches; light yellowish brown (2.5Y 6/3) silt loam, pale yellow (5Y 8/2) light yellowish brown dry; massive; hard, firm, nonsticky and nonplastic; common fine distinct yellowish brown (10YR 5/6) moist redox concentrations and common fine distinct gray (2.5Y 6/1) moist redox depletions; few very fine roots between peds; few tubular pores; strongly effervescent; very strongly alkaline (pH 9.6).

## *Eaglewing Series*

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Calcic Haplustepts

### *Typical Pedon*

Eaglewing gravelly silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed needles and twigs.

E—1 to 12 inches; light brownish gray (10YR 6/2) gravelly silt loam, dark grayish brown (10YR 4/2) moist; moderate medium and coarse granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine and common medium roots; 20 percent gravel; neutral (pH 7.2); clear smooth boundary.

Bw—12 to 21 inches; pale brown (10YR 6/3) gravelly silt loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and common medium roots; common fine pores; 25 percent gravel; neutral (pH 7.2); abrupt wavy boundary.

Bk1—21 to 28 inches; very pale brown (10YR 8/2) gravelly silt loam, light brownish gray (10YR 6/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common fine and few medium pores; 25 percent gravel; disseminated lime; violently effervescent; moderately alkaline (pH 8.2); clear wavy boundary.

Bk2—28 to 37 inches; very pale brown (10YR 8/2) gravelly silt loam, pale brown (10YR 6/3) moist; massive; soft, friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; few fine and medium pores; 10 percent

paragravel and 20 percent hard gravel; disseminated lime; violently effervescent; moderately alkaline (pH 8.4); gradual wavy boundary.
Bk3—37 to 60 inches; very pale brown (10YR 8/2) paragravelly silt loam, light gray (10YR 7/2) moist; massive; soft, friable, slightly sticky and slightly plastic; common very fine and few fine roots; 15 percent paragravel and 10 percent gravel; disseminated lime; violently effervescent; moderately alkaline (pH 8.4).

## *Finleypoint Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Haplustolls

### *Typical Pedon*

Finleypoint silt loam (Colors are for dry soil unless otherwise noted.)

A1—0 to 3 inches; dark grayish brown (10YR 4/2) cobbly silt loam, very dark brown (10YR 2/2), moist; weak fine and medium granular structure; soft, friable, nonsticky and slightly plastic; many very fine and fine roots; 10 percent gravel and 10 percent cobbles; neutral (pH 6.8); clear wavy boundary.
A2—3 to 10 inches; brown (10YR 4/3) cobbly silt loam, dark brown (10YR 3/3), moist; weak medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; 10 percent gravel and 10 percent cobbles; neutral (pH 6.8); clear wavy boundary.
E—10 to 20 inches; pale brown (10YR 6/3) cobbly silt loam, brown (10YR 4/3), moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; 10 percent gravel, 10 percent cobbles, and 5 percent stones; neutral (pH 6.8); clear wavy boundary.
E/Bw1—20 to 28 inches; E part (75%) is light gray (2.5Y 7/2) very cobbly silt loam, light brownish gray (2.5Y 6/2), moist; B part (25 percent) is light olive brown (2.5Y 5/4) very cobbly silt loam, olive brown (2.5Y 4/4) moist; moderate fine and medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; common fine roots; 20 percent gravel, 15 percent cobbles, and 5 percent stones; neutral (pH 7.0); gradual wavy boundary.
E/Bw2—28 to 60 inches; E part (55%) is light gray (2.5Y 7/2) very cobbly silt loam, light brownish gray (2.5Y 6/2), moist; B part (45 percent) is light olive brown (2.5Y 5/4) very cobbly silt loam, olive brown (2.5Y 4/4) moist; moderate fine and medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; few very fine roots; 20 percent gravel, 15 percent cobbles, and 5 percent stones; neutral (pH 7.2).

## *Foyslake Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Glossic Hapludalfs

### *Typical Pedon*

Foyslake gravelly silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; slightly decomposed needles and twigs.
E—2 to 12 inches; light gray (2.5Y 7/2) gravelly silt loam, grayish brown (2.5Y 5/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many fine, medium, and coarse roots; common fine dendritic tubular pores; 5 percent cobbles and 20 percent gravel; neutral (pH 6.9); clear smooth boundary.
Bt/E—12 to 21 inches; B part (about 60 percent) is light yellowish brown (2.5Y 6/4) gravelly silt loam, light olive brown (2.5Y 5/4) moist; E part (40 percent) is light

yellowish brown (2.5Y 6/3) gravelly silt loam, light olive brown (2.5Y 5/3) moist, that interfingers into the B part; texture mixed is gravelly silt loam; weak medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common fine and medium roots; common fine dendritic tubular pores; few faint patchy clay films on faces of peds (B part); 25 percent gravel and 5 percent cobbles; neutral (pH 7.0); clear wavy boundary.

Bt—21 to 28 inches; light olive brown (2.5Y 5/4) very gravelly silty clay loam, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; moderately hard, firm, moderately sticky and moderately plastic; common fine roots; few fine dendritic tubular pores; common distinct discontinuous clay films on faces of peds; 25 percent gravel, 5 percent cobbles, and 5 percent stones; slightly alkaline (pH 7.4); clear wavy boundary.

Bk—28 to 60 inches; light yellowish brown (2.5Y 6/3) very gravelly silt loam, light olive brown (2.5Y 5/4) moist; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common fine roots; few fine dendritic tubular pores; 25 percent gravel, 5 percent cobbles, and 5 percent stones; disseminated lime; many distinct coats of lime on undersides of rock fragments; strongly effervescent; moderately alkaline (pH 8.2).

## *Glaciercreek Series*

**Taxonomic Class:** Sandy--skeletal, mixed, frigid Andic Eutrudepts

### *Typical Pedon*

Glaciercreek cobbly ashy silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; slightly decomposed plant material

Bw—2 to 11 inches; light yellowish brown (10YR 6/4) cobbly ashy silt loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium roots; 10 percent gravel and 10 percent cobbles; moderately acid (pH 6.0); clear wavy boundary.

2BC—11 to 16 inches; pale brown (10YR 6/3) extremely cobbly coarse sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; 50 percent gravel, 30 percent cobbles, and 10 percent stones; moderately acid (pH 5.8); gradual wavy boundary.

2C—16 to 60 inches; light gray (2.5Y 7/2) extremely cobbly coarse sand, light brownish gray (2.5Y 6/2) moist; single grain; loose, nonsticky and nonplastic; few fine roots; 45 percent gravel, 30 percent cobbles, and 15 percent stones; moderately acid (pH 6.0).

## *Grantsdale Series*

**Taxonomic Class:** Coarse-silty over sandy or sandy-skeletal, mixed, superactive, frigid Calcic Haploxerolls

### *Typical Pedon*

Grantsdale loam, cultivated. (Colors are for dry soil unless otherwise noted.)

Ap—0 to 9 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; common fine and medium pores; neutral (pH 6.8); clear smooth boundary.

Bw—9 to 17 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common fine pores; neutral (pH 7.1); gradual smooth boundary.
Bk—17 to 32 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine pores; disseminated lime; strongly effervescent; moderately alkaline (pH 8.0); clear wavy boundary.
2BCk—32 to 36 inches; light gray (2.5Y 7/2) very gravelly loamy sand, grayish brown (2.5Y 5/2) moist; single grain; loose, nonsticky and nonplastic; few fine roots; thin coats of lime on undersides of gravel; 50 percent gravel and 10 percent cobbles; strongly effervescent; moderately alkaline (pH 8.2); gradual smooth boundary.
2C—36 to 60 inches; light brownish gray (10YR 6/2) very gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; 50 percent gravel and 10 percent cobbles; slightly effervescent; slightly alkaline (pH 7.5).

## *Half Moon Series*

**Taxonomic Class:** Fine-silty, mixed, active, frigid Typic Glossudalfs

### *Typical Pedon*

Half Moon silt loam (Colors are for moist soil unless otherwise noted.)

Oi—0 to 2 inches; slightly decomposed plant material.
E—2 to 6 inches; brown (10YR 5/3) silt loam, pale brown (10YR 6/3) dry; weak fine and medium platy structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; slightly acid (pH 6.2); clear wavy boundary.
E/Bt—6 to 11 inches; E part (60 percent) is light brownish gray (10YR 6/2) silt loam, very pale brown (10YR 8/2) dry, which tongues into the B part; B part (40 percent) is brown (10YR 5/3) silty clay loam, very pale brown (10YR 7/3) dry; texture mixed is silt loam; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; few thin clay films (B part) on faces of peds and in pores; slightly acid (pH 6.4); clear wavy boundary.
Bt—11 to 28 inches; brown (10YR 4/3) silty clay loam, brown 10YR 6/3 dry; moderate medium and coarse subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common very fine, fine, and medium roots; common thin clay films on faces of peds and in pores; neutral (pH 6.6); clear wavy boundary.
Bk—28 to 43 inches; light yellowish brown (2.5Y 6/3) silt loam, pale yellow (2.5Y 7/3) dry; massive; soft, friable, nonsticky and nonplastic; few very fine, fine, and medium roots; common filaments and soft masses of lime; slightly alkaline (pH 7.8); clear wavy boundary.
C—43 to 60 inches; light yellowish brown (2.5Y 6/3) silt loam, pale yellow (2.5Y 7/3) dry; massive; friable, soft, nonsticky and nonplastic; slightly alkaline (pH 7.8).

## *Haskillpass Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Vitrandic Argiustolls

### *Typical Pedon*

Haskillpass ashy silt loam (Colors are for dry soil unless otherwise noted.)

A—0 to 8 inches; dark grayish brown (10YR 4/2) ashy silt loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine tubular pores; 5 percent gravel; neutral (pH 6.6); clear wavy boundary.
AB—8 to 12 inches; brown (10YR 5/3) ashy silt loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine tubular pores; 5 percent gravel and 5 percent cobbles; neutral (pH 6.8); clear wavy boundary.
Bw—12 to 18 inches; light yellowish brown (10YR 6/4) cobbly silt loam, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine tubular pores; 10 percent gravel and 10 percent cobbles; neutral (pH 7.0); clear wavy boundary.
2E—18 to 29 inches; light gray (2.5Y 7/2) very cobbly silt loam, light brownish gray (2.5Y 6/2) moist; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common very fine and fine tubular pores; 20 percent gravel and 15 percent cobbles; neutral (pH 7.2); clear wavy boundary.
2Bt—29 to 43 inches; light yellowish brown (2.5Y 6/3) very cobbly silt loam, light olive brown (2.5Y 5/3) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common very fine and fine and few medium roots; few very fine and fine tubular pores; 25 percent gravel and 15 percent cobbles; slightly alkaline (pH 7.6); clear wavy boundary.
2Bk—43 to 60 inches; pale yellow (2.5Y 7/3) very cobbly silt loam, light olive brown (2.5Y 5/4) moist; weak medium and coarse subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine, fine, and medium roots; few very fine and fine tubular pores; 25 percent gravel and 15 percent cobbles; common fine and medium soft masses of lime; strongly effervescent; moderately alkaline (pH 8.0).

## *Hogsby Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lithic Haploxerolls

### *Typical Pedon*

Hogsby gravelly loam (Colors are for dry soil unless otherwise noted.)

A1—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, very friable, slightly sticky and slightly plastic; many fine roots, many fine pores; 20 percent gravel; neutral (pH 7.0); abrupt smooth boundary.
A2—6 to 15 inches; brown (10YR 5/3) extremely channery loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many fine roots; many fine pores; 55 percent channers and 15 percent flagstones; neutral (pH 7.0); abrupt smooth boundary.
R—15 inches; quartzite bedrock.

## *Holloway Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Andic Haplocryepts

### *Typical Pedon*

Holloway gravelly ashy silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inch; slightly decomposed forest litter.
A—2 to 11 inches; light yellowish brown (10YR 6/4) gravelly ashy silt loam, dark yellowish brown (10YR 4/4) dry; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; many very fine and fine pores; 15 percent gravel; slightly acid (pH 5.8).
2E—11 to 20 inches; light gray (10YR 7/2) extremely gravelly fine sandy loam, light brownish gray (10YR 6/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine, medium, and coarse roots; common very fine and fine pores; 55 percent gravel and 10 percent cobbles; moderately acid (pH 5.8); gradual smooth boundary.
2E/Bw—23 to 43 inches; E part (60 percent) is very pale brown (10YR 7/3) extremely gravelly sandy loam, pale brown (10YR 6/3) dry; B part (40 percent) is pale brown (10YR 6/3) extremely gravelly fine sandy loam, brown (10YR 5/3) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; common very fine and fine pores; 55 percent gravel and 15 percent cobbles; slightly acid (pH 6.2).
2C—43 to 60 inches; very pale brown (10YR 7/3) extremely gravelly sandy loam, pale brown (10YR 6/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; few fine pores; 55 percent gravel and 15 percent cobbles; slightly acid (pH 6.4).

## *Horseplains Series*

**Taxonomic Class:** Sandy, mixed, frigid Typic Xerofluvents

### *Typical Pedon*

Horseplains fine sandy loam (Colors are for dry soil unless otherwise noted.)

A—0 to 4 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine and medium and common coarse roots; neutral (pH 6.8); clear wavy boundary.
C1—4 to 10 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; many fine, common medium, and few coarse roots; neutral (pH 6.8); clear wavy boundary.
C2—10 to 35 inches; pale brown (10YR 6/3) stratified, loamy fine sand and fine sand, brown (10YR 5/3) moist; single grain; loose; nonsticky and nonplastic; many fine, common medium, and few coarse roots; neutral (pH 6.8); clear smooth boundary.
C3—35 to 39 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; slightly alkaline (pH 7.6); clear smooth boundary.
C4—39 to 60 inches: pale brown (10YR 6/3) stratified, loamy fine sand and fine sand, brown (10YR 5/3) moist; single grain; loose; common fine and medium and few coarse roots; neutral (pH 7.2).

## *Idahocreek Series*

**Taxonomic Class:** Coarse-silty, mixed, superactive, calcareous, frigid Mollic Endoaquents

### *Typical Pedon*

Idahocreek silt loam (Colors are for moist soil unless otherwise noted.)

A—0 to 6 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak medium granular structure; slightly hard, firm, nonsticky and nonplastic; many very fine, fine, and medium roots; disseminated lime; violently effervescent, moderately alkaline (pH 7.9); gradual smooth boundary.

AC—6 to 9 inches; very dark gray (10YR 3/1) silt, grayish brown (2.5Y 5/2) dry; weak medium subangular blocky structure; slightly hard, firm, nonsticky and nonplastic; common very fine and fine roots; disseminated lime; violently effervescent, moderately alkaline (pH 8.0); clear smooth boundary.

C1—9 to 18 inches; dark gray (2.5Y 4/1) silt, light gray (2.5Y 7/1) dry; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; disseminated lime; violently effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.

C2—18 to 60 inches; light brownish gray (2.5Y 6/2) silt, white (2.5Y 8/1) dry; massive; soft, friable, nonsticky and nonplastic; disseminated lime; violently effervescent, moderately alkaline (pH 8.0).

## *Kerl Series*

**Taxonomic Class:** Fine-loamy, mixed, superactive, frigid Calcic Haploxerolls

### *Typical Pedon*

Kerl loam (Colors are for dry soil unless otherwise noted.)

Ap—0 to 7 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine roots; many fine pores; 5 percent gravel; neutral (pH 6.8); abrupt wavy boundary.

Bw1—7 to 14 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine pores; 5 percent gravel; neutral (pH 7.0); clear irregular boundary.

Bw2—14 to 20 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; moderate medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common fine pores; 10 percent gravel; neutral (pH 7.2); clear wavy boundary.

Bk—20 to 60 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; few fine pores; violently effervescent; common masses and threads of lime; 15 percent gravel; moderately alkaline (pH 8.4).

## *Kila Series*

**Taxonomic Class:** Coarse-silty, mixed, superactive, frigid Vitrandic Eutrudepts

### *Typical Pedon*

Kila ashy silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; slightly decomposed forest litter.
A—1 to 8 inches; light brownish gray (10YR 6/2) ashy silt loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak medium granular; slightly hard, friable, nonsticky and nonplastic; common very fine, fine, and medium roots; few medium tubular and common fine dendritic tubular pores; strongly effervescent; slightly alkaline (pH 7.8); gradual smooth boundary.
Bw—8 to 22 inches; light yellowish brown (2.5Y 6/3) ashy silt loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common fine dendritic tubular pores; strongly effervescent; slightly alkaline (pH 7.8); clear smooth boundary.
Bk—22 to 41 inches; pale yellow (2.5Y 8/3) silt loam, light yellowish brown (2.5Y 6/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few very fine and fine roots; common fine dendritic tubular pores; few fine soft masses and disseminated lime; violently effervescent; moderately alkaline (pH 8.4); clear smooth boundary.
2C—41 to 60 inches; light gray (2.5Y 7/2) very gravelly silt loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; common prominent dark yellowish brown (10YR 4/6) redox concentrations; few very fine and fine roots; common fine dendritic tubular pores; 35 percent gravel, 10 percent cobbles, and 5 percent stones; disseminated lime; violently effervescent; moderately alkaline (pH 8.2).

## *Kingspoint Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Haplustepts

### *Typical Pedon*

Kingspoint very gravelly silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; slightly decomposed needles and twigs.
E—1 to 4 inches; light brownish gray (2.5Y 6/2) very gravelly silt loam, dark grayish brown (2.5Y 4/2) moist; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; 30 percent gravel and 10 percent cobbles; slightly alkaline (pH 7.6); clear wavy boundary.
Bw—4 to 16 inches; light yellowish brown (2.5Y 6/3) very gravelly silt loam, olive brown (2.5Y 4/3), moist; weak fine and medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine, fine, medium, coarse, and very coarse roots; 30 percent gravel and 10 percent cobbles; slightly alkaline (pH 7.6); clear wavy boundary.
Bk—16 to 60 inches; light gray (2.5Y 7/2) very gravelly silt loam, light olive brown (2.5Y 5/3), moist; massive; slightly hard, firm, slightly sticky and slightly plastic; common fine and medium and few coarse and very coarse roots; 30 percent gravel, 10 percent cobbles, and 5 percent stones; violently effervescent; moderately alkaline (pH 8.2).

## *Lesier Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Vitrandic Eutrudepts

### *Typical Pedon*

Lesier gravelly ashy silt loam (Colors are for moist soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed and slightly decomposed forest litter.
A—1 to 2 inches; dark brown (10YR 3/3) gravelly ashy silt loam, brown (10YR 5/3) dry; weak fine and medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and nonplastic; many fine and medium and few coarse roots; volcanic ash component; 20 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary.
Bw—2 to 11 inches; brown (10YR 4/3) gravelly ashy silt loam, pale brown (10YR 6/3) dry; weak fine and medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and nonplastic; many fine and medium and few coarse roots; 20 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary.
2E—11 to 18 inches; brown (10YR 5/3) very gravelly sandy loam, very pale brown (10YR 7/3) dry; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine and medium and few coarse roots; 30 percent gravel and 10 percent cobbles; slightly acid (pH 6.2); clear wavy boundary.
2Bk1—18 to 35 inches; pale brown (10YR 6/3) very gravelly sandy loam, very pale brown (10YR 8/3) dry; weak fine and medium subangular blocky structure; slightly hard, very friable; nonsticky and nonplastic; common medium and coarse roots; 40 percent gravel and 20 percent cobbles; disseminated lime; common distinct coats of lime on undersides of rock fragments; strongly effervescent; slightly alkaline (pH 7.6); gradual wavy boundary.
2Bk2—35 to 60 inches; pale brown (10YR 6/3) extremely cobbly sandy loam, very pale brown (10YR 8/3) dry; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few medium and coarse roots; 45 percent gravel and 30 percent cobbles; disseminated lime; many distinct coats of lime on undersides of rock fragments; violently effervescent; moderately alkaline (pH 8.2).

## *Loonlake Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Andic Paleudalfs

### *Typical Pedon*

Loonlake gravelly ashy silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.
Bw—2 to 11 inches; light yellowish brown (10YR 6/4) gravelly ashy silt loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; common fine and medium and few coarse roots; 15 percent gravel; moderately acid (pH 6.0); clear wavy boundary.
2E—11 to 26 inches; very pale brown (10YR 7/3) very gravelly sandy loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine and medium and few coarse roots; 35 percent gravel and 10 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary.
2E/Bt—26 to 38 inches; E part (80 percent) is very pale brown (10YR 7/3) extremely cobbly sandy loam, brown (10YR 5/3) moist, Bt part (20 percent) is pale brown (10YR 6/3) extremely cobbly sandy clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium and few coarse roots; 40 percent gravel and 30 percent cobbles; moderately acid (pH 6.0); gradual wavy boundary.
2Bt—38 to 60 inches; pale brown (10YR 6/3) very gravelly sandy clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, firm,

moderately sticky and moderately plastic; common medium and few coarse roots; continuous faint clay films on faces of peds; 40 percent gravel and 10 percent cobbles; slightly acid (pH 6.4).

## *Lostprairie Series*

**Taxonomic Class:** Fine-silty, mixed, active, frigid Vitrandic Argiustolls

### *Typical Pedon*

Lostprairie silt loam (Colors are for dry soil unless otherwise noted.)

A—0 to 10 inches; dark gray (10YR 4/1) ashy silt loam, black (10YR 2/1) moist; moderate medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; slightly effervescent; moderately alkaline (pH 8.1); clear wavy boundary.

2E—10 to 26 inches; light gray (10YR 7/2) silt, brown (10YR 5/3) moist; weak coarse subangular blocky structure parting to moderate thin platy; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium roots; moderately alkaline (pH 7.9); gradual wavy boundary.

2Bt—26 to 44 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 5/2) moist; moderate coarse subangular blocky structure; hard, firm, moderately sticky and moderately plastic; few fine roots; few distinct clay films on faces of peds; few fine distinct yellowish brown (10YR 5/6) redox concentrations; slightly alkaline (pH 7.8); gradual wavy boundary.

2C1—44 to 52 inches; pale yellow (5Y 8/2) silt loam, light olive gray (5Y 6/2) moist; massive; hard, firm, moderately sticky and moderately plastic; common fine and medium distinct yellowish brown (10YR 5/6) redox concentrations; slightly alkaline (pH 7.6); gradual wavy boundary.

2C2—52 to 60 inches; pale yellow (5Y 8/2) silt, light olive gray (5Y 6/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium distinct yellowish brown (10YR 5/6) redox concentrations; slightly alkaline (pH 7.6).

## *Lozeau Series*

**Taxonomic Class:** Fine-loamy, mixed, active, frigid Glossic Hapludalfs

### *Typical Pedon*

Lozeau gravelly loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed and partially decomposed forest litter.

A—1 to 4 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; 20 percent gravel; moderately acid (pH 6.0); clear smooth boundary.

E/Bw—4 to 17 inches; E part (65 percent) is light brownish gray (10YR 6/2) gravelly loam, grayish brown (10YR 5/2) moist; B part (35 percent) is pale brown (10YR 6/3) gravelly loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine and common fine and medium roots; few fine and medium tubular pores; 20 percent gravel; moderately acid (pH 6.0); clear smooth boundary.

Bt/E—17 to 33 inches; Bt part (65 percent) is light yellowish brown (10YR 6/4) gravelly clay loam, dark yellowish brown (10YR 4/4) moist; E part (35 percent) is very pale brown (10YR 7/3) gravelly loam, brown (10YR 5/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, moderately sticky and

slightly plastic; few fine and common medium roots; common fine tubular pores; common faint clay films on faces of peds and in pores; 15 percent paragravel, 15 percent gravel, and 5 percent cobbles; slightly acid (pH 6.2); gradual smooth boundary.

Cr—33 to 60 inches; semiconsolidated welded tuff.

## *Lynchlake Series*

**Taxonomic Class:** Fine-silty, mixed, active, frigid Vitrandic Hapludalfs

### *Typical Pedon*

Lynchlake ashy silt loam (Colors are for moist soil unless otherwise stated.)

Oi—0 to 3 inches; undecomposed and slightly decomposed forest litter.

E—3 to 9 inches; brown (10YR 5/3) ashy silt loam, very pale brown (10YR 7/3) dry; weak medium subangular blocky structure parting to weak fine subangular blocky; soft, very friable, slightly sticky and nonplastic; common very fine, fine, medium, coarse, and very coarse roots; moderately acid (pH 5.8); clear wavy boundary.

Bw—9 to 15 inches; yellowish brown (10YR 5/4) ashy silt loam, very pale brown (10YR 7/4) dry; weak medium subangular blocky structure parting to weak very fine and fine subangular blocky; soft, very friable, slightly sticky and nonplastic; common very fine, fine, medium, coarse, and very coarse roots; moderately acid (pH 5.8); gradual wavy boundary.

2E/Bt—15 to 23 inches; E part (75 percent) is light olive brown (2.5Y 5/3) silt loam, pale yellow (2.5Y 7/3) dry; B part (25 percent) is light olive brown (2.5Y 5/4) silty clay loam, light yellowish brown (2.5Y 6/4) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; few distinct clay films on faces of peds; slightly acid (pH 6.2); gradual wavy boundary.

2Bt—23 to 41 inches; light olive brown (2.5Y 5/4) silty clay loam, light yellowish brown (2.5Y 6/4) dry; moderate medium and coarse subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common very fine, fine, and medium roots; common distinct clay films on faces of peds; slightly acid (pH 6.4); clear wavy boundary.

2Bk—41 to 60 inches; light olive brown (2.5Y 5/3) silt loam, pale yellow (2.5Y 7/3) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; 10 percent fine and medium soft masses of lime in matrix; strongly effervescent; moderately alkaline (pH 8.0)

## *McCollum Series*

**Taxonomic Class:** Coarse-loamy, mixed, superactive, frigid Typic Haploxerolls

### *Typical Pedon*

McCollum fine sandy loam (Colors are for dry soil unless otherwise noted.)

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; neutral (pH 7.0); clear wavy boundary.

Bw—10 to 21 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky

and nonplastic; common very fine and fine and few medium and coarse roots; neutral (pH 6.8); clear wavy boundary.
C—21 to 60 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; neutral (pH 6.8).

## *McGregor Series*

**Taxonomic Class:** Coarse-silty, mixed, superactive, nonacid, frigid Aquandic Fluvaquents

### *Typical Pedon*

McGregor ashy silt loam (Colors are for moist soil unless otherwise noted.)

A—0 to 5 inches; black (10YR 2/1) ashy silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure; moderately hard, friable, slightly sticky and slightly plastic; few fine and many very fine roots; few fine irregular and many very fine interstitial pores; slightly acid (pH 6.2); clear smooth boundary.
E—5 to 14 inches; dark grayish brown (10YR 4/2) ashy silt loam, light brownish gray (10YR 6/2) dry; moderate thin platy structure; slightly hard, friable, nonsticky and nonplastic; few fine and common very fine roots; few fine tubular and common very fine irregular pores; 10 percent medium worm casts; slightly alkaline (pH 7.4); clear smooth boundary.
2E—14 to 16 inches; grayish brown (2.5Y 5/2) silt loam, light gray (2.5Y 7/2) dry; moderate thin platy structure; moderately hard, friable, nonsticky and nonplastic; common medium roots; common medium irregular pores; neutral (pH 7.2); clear smooth boundary.
2BC—16 to 26 inches; brown (10YR 5/3) very fine sandy loam, light gray (10YR 7/2), dry; massive; slightly hard, friable, nonsticky and nonplastic; few medium roots; common medium irregular pores; 1 percent fine prominent spherical dark yellowish brown (10YR 4/6) moist iron-manganese concretions; neutral (pH 7.0); clear smooth boundary.
3Cg1—26 to 33 inches; grayish brown (2.5Y 5/2) silt loam, light gray (2.5Y 7/2) dry; massive; moderately hard, friable, slightly sticky and slightly plastic; few very fine roots; common medium irregular pores; 1 percent fine prominent spherical dark yellowish brown (10YR 4/6) moist iron-manganese concretions; 1 percent fine spherical carbonate nodules; neutral (pH 7.0); gradual smooth boundary.
3Cg2—33 to 58 inches; light yellowish brown (2.5Y 6/3) silt loam, light gray (2.5Y 7/2) dry; massive; moderately hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine irregular pores; 2 percent fine prominent spherical dark yellowish brown (10YR 4/6) moist iron-manganese concretions; 1 percent fine spherical carbonate nodules; neutral (pH 7.0); gradual smooth boundary.
3Cg3—58 to 64 inches; light brownish gray (2.5Y 6/2) silt loam, light gray (2.5Y 7/2) dry; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; few very fine irregular pores; 5 percent fine prominent spherical dark yellowish brown (10YR 4/6) moist iron-manganese concretions; 5 percent cobbles and gravel; neutral (pH 6.8).

## *McLangor Series*

**Taxonomic Class:** Loamy, mixed, euic, frigid Terric Haplohemists

### *Typical Pedon*

McLangor mucky peat (Colors are for moist soil unless otherwise noted.)

Oe1—0 to 8 inches; black (10YR 2/1) broken face and rubbed mucky peat (hemic material); about 70 percent fiber and raw herbaceous plant material, about 30 percent rubbed; nonsticky and nonplastic; herbaceous fiber, mostly residue from Phragmites arundinacea; many very fine and fine roots; slightly acid (pH 6.2); gradual smooth boundary.
Oe2—8 to 17 inches; black (10YR 2/1) broken face and rubbed mucky peat (hemic material); about 50 percent fiber, about 20 percent rubbed; nonsticky and nonplastic; herbaceous fiber; common very fine and fine roots; slightly acid (pH 6.4); clear smooth boundary.
C1—17 to 20 inches; stratified (1/4 to 1/2 inch) very dark gray (10YR 3/1) mucky silt loam (50 percent), dark gray (10YR 4/1) silt loam (40 percent), and black (10YR 2/1) mucky silt loam (10 percent); massive; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots; neutral (pH 6.6); abrupt smooth boundary.
C2—20 to 36 inches; stratified (1/4 to 1/2 inch) light gray (10YR 7/2) silt and very fine sandy loam; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; neutral (pH 6.8); abrupt wavy boundary.
C3—36 to 42 inches; stratified (1/4 to 3/4 inch) very dark gray (10YR 3/1) mucky silt loam (60 percent), dark gray (10YR 4/1) silt loam (30 percent), and black (10YR 2/1) mucky peat (10 percent); massive; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots; slightly acid (pH 6.2); clear wavy boundary.
Oa—42 to 54 inches; black (10YR 2/1) broken face and rubbed muck (sapric material); about 30 percent fiber, about 5 percent rubbed; massive; nonsticky and nonplastic; herbaceous fiber; common very fine and fine roots; moderately acid (pH 5.8); abrupt wavy boundary.
Cg—54 to 70 inches; stratified (1/4 to 1/2 inch) gray (5Y 6/1) silt and silt loam; massive; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots; moderately acid (pH 5.8).

## *McMannamy Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Inceptic Haplustalfs

### *Typical Pedon*

McMannamy gravelly silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed needles and twigs.
E—1 to 10 inches; light gray (10YR 7/1) gravelly silt loam, grayish brown (10YR 5/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many fine and medium and common coarse roots; common very fine and fine dendritic tubular pores; 5 percent cobbles and 20 percent gravel; neutral (pH 7.2); clear wavy boundary.
Bt—10 to 17 inches; light yellowish brown (2.5Y 6/4) very gravelly silt loam, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common very fine, fine, and medium and few coarse roots; few very fine and fine dendritic tubular pores; common distinct discontinuous clay films on faces of peds; 25 percent gravel, 5 percent cobbles, and 5 percent stones; slightly alkaline (pH 7.4); clear smooth boundary.
Bk—17 to 60 inches; light gray (2.5Y 7/2) very gravelly silt loam, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common fine and very fine roots; few very fine dendritic tubular pores; 25 percent gravel, 5 percent cobbles, and 5 percent stones; disseminated lime,

many distinct coats of lime on undersides of rock fragments; violently effervescent; moderately alkaline (pH 8.2).

## *Meadowpass Series*

**Taxonomic Class:** Fine, mixed, active, frigid Typic Argixerolls

### *Typical Pedon*

Meadowpass gravelly loam (Colors are for dry soil unless otherwise noted.)

A1—0 to 3 inches; dark gray (10YR 4/1) gravelly loam, very dark gray (10YR 3/1) moist; weak fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic, many very fine and fine and few medium and coarse roots; 15 percent gravel; slightly acid (pH 6.4); clear smooth boundary.

A2—3 to 9 inches; dark gray (10YR 4/1) gravelly loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine and few medium and coarse roots; few fine tubular pores; 5 percent cobbles and 15 percent gravel; slightly acid (pH 6.4); clear smooth boundary.

Bt1—9 to 12 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; common fine tubular pores; few faint clay films on faces of peds; 5 percent cobbles and 15 percent gravel; slightly acid (pH 6.4); clear smooth boundary.

Bt2—12 to 18 inches; pale brown (10YR 6/3) sandy clay, brown (10YR 4/3) moist; weak coarse prismatic structure parting to strong medium angular blocky; hard, firm, very sticky and very plastic; common very fine and fine and few medium roots; common very fine and fine interstitial and tubular pores; common prominent clay films on faces of peds and in pores; 10 percent gravel and 15 percent soft fragments; neutral (pH 6.8); gradual smooth boundary.

Bt/C—18 to 30 inches; B part (60 percent) is light olive brown (2.5Y 5/4) sandy clay, olive brown (2.5Y 4/4) moist; C part (40 percent) is pale yellow (2.5Y 7/4) sandy clay loam, light olive brown (2.5Y 5/4) moist; weak coarse prismatic structure; slightly hard, firm, very sticky and very plastic; few very fine and fine roots along prism faces; few tubular and interstitial pores; common distinct clay films on faces of peds; 10 percent gravel and 40 percent soft fragments; neutral (pH 7.0); gradual smooth boundary.

Cr—30 inches; semiconsolidated welded tuff.

## *Meadowpeak Series*

**Taxonomic Class:** Coarse-silty, mixed, superactive, nonacid, frigid Aeric Fluvaquents

### *Typical Pedon*

Meadowpeak silt loam (Colors are for moist soil unless otherwise noted.)

A—0 to 4 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; weak fine and medium subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; slightly acid (pH 6.2); clear wavy boundary.

AC—4 to 9 inches; dark grayish brown (10YR 4/2) silt loam, grayish brown (10YR 5/2) dry; moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; slightly acid (pH 6.2); clear wavy boundary.

C1—9 to 16 inches; dark gray (10YR 4/1) silt loam, gray (10YR 5/1) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; slightly acid (pH 6.4); clear wavy boundary.
C2—16 to 25 inches; olive gray (5Y 5/2) silt loam, light gray (5Y 7/2) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; neutral (pH 6.8); gradual wavy boundary.
C3—25 to 34 inches; olive gray (5Y 5/2) and very dark grayish brown (10YR 3/2) silt loam consisting of thin layers of silt loam and loam, light gray (5Y 7/2) and grayish brown (10YR 5/2) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine, medium, and coarse roots; neutral (pH 7.0); gradual wavy boundary.
C4—34 to 60 inches; white (5Y 8/1) silt loam, light brownish gray (2.5Y 6/2) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine, medium, and coarse roots; few fine distinct olive yellow (5Y 6/6) redox concentrations; neutral (pH 6.8).

## *Minesinger Series*

**Taxonomic Class:** Clayey--skeletal, mixed, superactive, frigid Typic Argixerolls

### *Typical Pedon*

Minesinger gravelly loam (Colors are for dry soil unless otherwise noted.)

A1—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky and nonplastic; many fine and few medium roots; 5 percent cobbles and 20 percent gravel; neutral (pH 6.6); clear smooth boundary.
A2—6 to 13 inches; brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; many fine roots; 10 percent cobbles and 20 percent gravel; neutral (pH 7.3); gradual smooth boundary.
Bt—13 to 24 inches; light yellowish brown (10YR 6/4) very gravelly clay, dark yellowish brown (10YR 4/4) moist; strong fine and medium angular blocky structure; hard, firm, moderately sticky and very plastic; common fine roots; common distinct clay films on faces of peds; 15 percent cobbles and 30 percent gravel; slightly alkaline (pH 7.6); gradual smooth boundary.
Bk—24 to 60 inches; very pale brown (10YR 7/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; weak medium angular blocky structure; slightly hard, firm, moderately sticky and moderately plastic; few fine roots; 15 percent cobbles and 30 percent gravel; many fine masses of lime; strongly effervescent; moderately alkaline (pH 8.0).

## *Mitten Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Andic Eutrudepts

### *Typical Pedon*

Mitten gravelly ashy silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.
Bw—2 to 11 inches; light yellowish brown (10YR 6/4) gravelly ashy silt loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable,

nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 15 percent angular gravel; slightly acid (pH 6.4); abrupt wavy boundary.

2E—11 to 18 inches; pinkish gray (7.5YR 7/2) very gravelly sandy loam, brown (7.5YR 5/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 5 percent angular cobbles and 45 percent angular gravel; slightly acid (pH 6.2); clear wavy boundary.

2E and Bw—18 to 36 inches; E part (80 percent) is pinkish gray (7.5YR 7/2) extremely gravelly sandy loam, brown (7.5YR 5/2) moist; B part (20 percent) is brown (7.5YR 5/4) extremely gravelly sandy loam, lamellae, brown (7.5YR 4/4) moist; lamellae are 1/4- to 1/2-inch thick; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; 15 percent angular cobbles and 50 percent angular gravel; slightly acid (pH 6.2); diffuse irregular boundary.

2BC—36 to 60 inches; pinkish gray (7.5YR 7/2) extremely gravelly sandy loam, brown (7.5YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; 15 percent angular cobbles and 50 percent angular gravel; neutral (pH 6.6).

## *Niarada Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Calcic Haploxerolls

### *Typical Pedon*

Niarada gravelly loam (Colors are for dry soil unless otherwise noted.)

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; few pores; 25 percent gravel; neutral (pH 6.8); clear smooth boundary.

A—7 to 14 inches; dark grayish brown (10YR 4/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine and common medium roots; few very fine and fine tubular pores; 35 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bw—14 to 18 inches; pale brown (10YR 6/3) very gravelly loam, grayish brown (10YR 5/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine and common medium roots; few very fine and fine tubular pores; 5 percent cobbles and 50 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bk1—18 to 29 inches; very pale brown (10YR 8/2) very gravelly loam, pale brown (10YR 6/3) moist; massive; very friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; few very fine and fine tubular pores; 5 percent cobbles and 50 percent gravel; disseminated lime; common distinct coats of lime on undersides and sides of gravel; violently effervescence; moderately alkaline (pH 8.4); gradual wavy boundary.

Bk2—29 to 60 inches; light gray (10YR 7/2) very gravelly loam, brown (10YR 5/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; few fine and medium roots; 5 percent cobbles and 50 percent gravel; disseminated lime; common distinct coats of lime covering gravel; violently effervescence; moderately alkaline (pH 8.4).

## *Pashua Series*

**Taxonomic Class:** Fine, mixed, active, frigid Typic Haplustalfs

### *Typical Pedon*

Pashua gravelly loam (Colors are for dry soil unless otherwise noted.)

A—0 to 8 inches; yellowish brown (10YR 5/4) gravelly loam, dark yellowish brown (10YR 3/4) moist; weak moderate subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine, fine, and medium and few coarse roots; few fine tubular pores; 20 percent gravel; slightly acid (pH 6.4); clear smooth boundary.

E—8 to 14 inches; very pale brown (10YR 7/3) gravelly silt loam, light yellowish brown (10YR 6/4) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common fine and medium and few very fine and coarse roots; many very fine and common fine tubular pores; 15 percent gravel, 15 percent paragravel, and 5 percent cobbles; neutral (pH 6.6); clear smooth boundary.

Bt/E—14 to 19 inches; B part (70 percent) is brownish yellow (10YR 6/6) gravelly clay, yellowish brown (10YR 5/6) moist; E part (30 percent) is very pale brown (10YR 8/4) sandy clay, light yellowish brown (10YR 6/4) moist; moderate medium and coarse angular blocky structure; slightly hard, firm, very sticky and very plastic; few very fine, fine, and coarse roots; many very fine and fine tubular pores; few distinct clay films on faces of peds and in pores; 20 percent gravel, 5 percent cobbles, and 5 percent paragravel; neutral (pH 6.6); clear smooth boundary.

Bt1--19 to 25 inches; yellow (10YR 7/6) paragravelly clay, yellowish brown (10YR 5/6) moist; strong medium angular blocky structure; hard, firm, very sticky and very plastic; few fine and coarse roots; many very fine and fine tubular pores; common distinct clay films on faces of peds and in pores; 10 percent gravel, 15 percent paragravel; neutral (pH 6.8); gradual smooth boundary.

Bt2—25 to 37 inches; yellow (10YR 7/6) gravelly clay loam, brownish yellow (10YR 6/6) moist; moderate medium and coarse subangular blocky structure; slightly hard, firm, slightly sticky and plastic; few very fine, fine, and coarse roots; many very fine and fine tubular pores; few distinct clay films on faces of peds and in pores; 25 percent paragravel, 15 percent gravel, and 10 percent cobbles; neutral (pH 6.6); clear smooth boundary.

Cr—37 to 60 inches; semiconsolidated welded tuff.

## *Pashua Taxadjunct*

**Taxonomic Class:** Fine, mixed, active, frigid Typic Hapludalfs

### *Typical Pedon*

Pashua gravelly loam (Colors are for dry soil unless otherwise noted.)

A—0 to 8 inches; yellowish brown (10YR 5/4) gravelly loam, dark yellowish brown (10YR 3/4) moist; weak moderate subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine, fine, and medium and few coarse roots; few fine tubular pores; 20 percent gravel; slightly acid (pH 6.4); clear smooth boundary.

E—8 to 14 inches; very pale brown (10YR 7/3) gravelly silt loam, light yellowish brown (10YR 6/4) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common fine and medium and few very fine and coarse roots; many very fine and common fine tubular pores; 15 percent gravel, 15 percent paragravel, and 5 percent cobbles; neutral (pH 6.6); clear smooth boundary.

Bt/E—14 to 19 inches; B part (70 percent) is brownish yellow (10YR 6/6) gravelly clay, yellowish brown (10YR 5/6) moist; E part (30 percent) is very pale brown (10YR

8/4) sandy clay, light yellowish brown (10YR 6/4) moist; moderate medium and coarse angular blocky structure; slightly hard, firm, very sticky and very plastic; few very fine, fine, and coarse roots; many very fine and fine tubular pores; few distinct clay films on faces of peds and in pores; 20 percent gravel, 5 percent cobbles, and 5 percent paragravel; neutral (pH 6.6); clear smooth boundary.

Bt1—19 to 25 inches; yellow (10YR 7/6) paragravelly clay, yellowish brown (10YR 5/6) moist; strong medium angular blocky structure; hard, firm, very sticky and very plastic; few fine and coarse roots; many very fine and fine tubular pores; common distinct clay films on faces of peds and in pores; 10 percent gravel and 15 percent paragravel; neutral (pH 6.8); gradual smooth boundary.

Bt2—25 to 37 inches; yellow (10YR 7/6) gravelly clay loam, brownish yellow (10YR 6/6) moist; moderate medium and coarse subangular blocky structure; slightly hard, firm, slightly sticky and moderately plastic; few very fine, fine, and coarse roots; many very fine and fine tubular pores; few distinct clay films on faces of peds and in pores; 25 percent paragravel, 15 percent gravel, and 10 percent cobbles; neutral (pH 6.6); clear smooth boundary.

Cr—37 to 60 inches; semiconsolidated welded tuff.

## *Perma Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Haplustolls

### *Typical Pedon*

Perma gravelly loam (Colors are for dry soil unless otherwise noted.)

A1—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; common very fine and fine pores; 20 percent gravel; neutral (pH 7.0); clear wavy boundary.

A2—6 to 12 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; common very fine and fine pores; 30 percent gravel; neutral (pH 7.2); clear wavy boundary.

Bw1—12 to 22 inches; brown (10YR 5/3) very gravelly loam, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine pores; 15 percent cobbles and 35 percent gravel; neutral (pH 7.2); gradual wavy boundary.

Bw2—22 to 36 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine pores; 15 percent cobbles and 40 percent gravel; slightly alkaline (pH 7.4); gradual wavy boundary.

BC—36 to 60 inches; very pale brown (10YR 7/3) extremely gravelly loamy sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; 20 percent cobbles and 50 percent gravel; slightly alkaline (pH 7.4).

## *Pleasantvalley Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Vitrandic Eutrudepts

### *Typical Pedon*

Pleasantvalley gravelly ashy silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed and slightly decomposed needles and twigs.
E—1 to 4 inches; brown (10YR 5/3) gravelly ashy silt loam, brown (10YR 4/3) moist; weak fine subangular blocky structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; 5 percent stones, 15 percent gravel; neutral (pH 6.6); clear wavy boundary.
Bw—4 to 14 inches; yellowish brown (10YR 5/4) gravelly ashy silt loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; 5 percent stones and 15 percent gravel; slightly acid (pH 6.4); clear wavy boundary.
2E—14 to 26 inches; pale brown (10YR 6/3) very cobbly silt loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; 30 percent gravel, 20 percent cobbles, and 5 percent stones; neutral (pH 6.8); gradual wavy boundary.
2E/Bw—26 to 34 inches; E part (85 percent) is pale yellow (2.5Y 7/3) very cobbly silt loam, light yellowish brown (2.5Y 6/3) moist that surrounds the B part; B part (15 percent) is light yellowish brown (10YR 6/4) very cobbly silt loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; 30 percent gravel, 20 percent cobbles, and 5 percent stones; neutral (pH 7.0); abrupt wavy boundary.
2E and Bt—34 to 60 inches; E part (85 percent) is pale olive (5Y 6/3) very cobbly silt loam, olive (5Y 5/3) moist; B part (15 percent) is light yellowish brown (2.5Y 6/3) silty clay loam discontinuous lamellae 1/8- to 1/4-inch thick, light olive brown (2.5Y 5/3) moist; texture mixed is very cobbly silt loam, weak fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; 20 percent gravel and 15 percent cobbles; neutral (pH 7.2).

## *Quast Series*

**Taxonomic Class:** Coarse-silty, mixed, superactive, frigid Typic Haplustolls

### *Typical Pedon*

Quast very fine sandy loam (Colors are for dry soil unless otherwise noted.)

A1—0 to 10 inches; very dark grayish brown (10YR 3/2) very fine sandy loam, very dark brown (10YR 2/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine irregular pores; neutral (pH 7.0); clear wavy boundary.
A2—10 to 15 inches; dark grayish brown (10YR 4/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine irregular pores; slightly alkaline (pH 7.3); clear wavy boundary.
Bw1—15 to 30 inches; brown (10YR 5/3) very fine sandy loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots; common very fine irregular pores; neutral (pH 7.2) clear wavy boundary.
Bw2—30 to 39 inches; light yellowish brown (2.5Y 6/3) very fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots; common very fine irregular pores; slightly alkaline (pH 7.6); clear wavy boundary.
Bk—39 to 60 inches; pale yellow (2.5Y 7/3) very fine sandy loam, light olive brown (2.5Y 5/3) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; few very fine and fine roots; few very fine irregular pores; common fine threads of lime; strongly effervescent; slightly alkaline (pH 7.9).

## *Repp Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Calcic Haplustepts

### *Typical Pedon*

Repp very gravelly loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed and slightly decomposed forest litter.
E1—1 to 6 inches; light brownish gray (10YR 6/2) very gravelly loam, dark grayish brown (10YR 4/2) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 40 percent gravel; slightly effervescent; slightly alkaline (pH 7.4); clear smooth boundary.
E2—6 to 13 inches; light brownish gray (10YR 6/2) very gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; 45 percent gravel; slightly effervescent; slightly alkaline (pH 7.4); clear smooth boundary.
Bw—13 to 25 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; few coats of lime on gravel, mainly on undersides; 50 percent gravel; disseminated lime; violently effervescent; moderately alkaline (pH 8.4); gradual wavy boundary.
Bk1—25 to 41 inches; very pale brown (10YR 7/3) extremely gravelly loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; thin coats of lime on gravel, mainly on undersides; 70 percent gravel; disseminated lime; violently effervescent; moderately alkaline (pH 8.4); gradual wavy boundary.
Bk2—41 to 60 inches; very pale brown (10YR 7/3) extremely gravelly loam, pale brown (10YR 6/3) moist; massive; soft, very friable, nonsticky and nonplastic; coats of lime on gravel, mainly on undersides; 65 percent gravel; disseminated lime; violently effervescent; moderately alkaline (pH 8.2).

## *Rockhill Series*

**Taxonomic Class:** Ashy--skeletal, mixed, frigid Lithic Udivitrands

### *Typical Pedon*

Rockhill very gravelly silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed and slightly decomposed forest litter.
A—1 to 5 inches; brown (10YR 5/3) very gravelly ashy silt loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; 5 percent cobbles and 40 percent gravel; slightly acid (pH 6.2); clear smooth boundary.
Bw—5 to 14 inches; light yellowish brown (10YR 6/4) very gravelly ashy silt loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; 5 percent cobbles and 50 percent gravel; slightly acid (pH 6.2); clear wavy boundary.
2C—14 to 19 inches; light yellowish brown (10YR 6/4) extremely gravelly silt loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; 10 percent cobbles and 65 percent gravel; slightly acid (pH 6.2); abrupt wavy boundary.
R—19 inches; fractured argillite and quartzite bedrock.

## *Rumblecreek Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Haplic Glossudalfs

***Typical Pedon***

Rumblecreek gravelly loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.
E1—2 to 10 inches; pale brown (10YR 6/3) gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic, many fine, medium, and coarse roots; many fine pores; 25 percent gravel; moderately acid (pH 6.0); clear wavy boundary.
E2—10 to 22 inches; light gray (10YR 7/2) gravelly loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many fine and medium roots; many fine pores; 30 percent gravel; moderately acid (pH 6.0); gradual wavy boundary.
Bt/E—22 to 34 inches; B part (60 percent) is yellowish brown (10YR 5/6) very gravelly clay loam, dark yellowish brown (10YR 4/4) moist; E part (40 percent) light gray (10YR 7/2) very gravelly loam, grayish brown (10YR 5/2) moist that tongues into the B part; texture mixed is very gravelly clay loam; moderate coarse subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; common fine roots; common fine pores; 5 percent cobbles and 35 percent gravel; common faint clay films on faces of peds; slightly acid (pH 6.2); gradual wavy boundary.
Bt—34 to 60 inches; light yellowish brown (10YR 6/4) very gravelly clay loam, brown (10YR 4/3) moist; moderate medium coarse subangular blocky structure; very hard, friable, moderately sticky and moderately plastic; few fine roots; common fine pores; 40 percent gravel and 5 percent cobbles; common distinct clay films on faces of peds and surfaces of gravel; slightly acid (pH 6.2).

## *Sharrott Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lithic Haplustepts

***Typical Pedon***

Sharrott gravelly loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inches; undecomposed and slightly decomposed forest litter.
A—1 to 5 inches; brown (10YR 5/3) gravelly loam, brown (10YR 4/3) moist; moderate fine granular structure; soft, friable, nonsticky and nonplastic; many very fine to coarse roots; 20 percent gravel; slightly acid (pH 6.5); clear smooth boundary.
Bw—5 to 11 inches; light yellowish brown (10YR 6/4) very gravelly loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine to coarse roots; 40 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary.
BC—11 to 13 inches; pale brown (10YR 6/3) extremely gravelly loam, brown (10YR 4/3) moist; massive; soft, friable, nonsticky and nonplastic; few medium and coarse roots; 70 percent gravel; moderately acid (pH 6.0); abrupt irregular boundary.
R—13 inches; fractured argillite bedrock.

## *Stevie Series*

**Taxonomic Class:** Ashy over loamy-skeletal, amorphic over mixed, superactive, frigid Typic Udivitrands

### *Typical Pedon*

Stevie gravelly silt loam (Colors are for moist soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed and partially decomposed forest litter.
A—1 to 2 inches; very dark grayish brown (10YR 3/2) gravelly silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and medium and common very fine and coarse roots; 15 percent gravel and 5 percent cobbles; slightly acid (pH 6.2); abrupt wavy boundary.
Bw1—2 to 8 inches; dark yellowish brown (10YR 4/4) gravelly silt loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure parting to fine and medium granular; soft, very friable, nonsticky and nonplastic; many fine and medium and common very fine and coarse roots; 15 percent gravel and 5 percent cobbles; slightly acid (pH 6.2); gradual wavy boundary.
Bw2—8 to 18 inches; dark yellowish brown (10YR 4/4) gravelly silt loam, light yellowish brown (10YR 6/4) dry; moderate fine and medium subangular blocky structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; common fine, medium, and coarse roots; 25 percent gravel and 5 percent cobbles; moderately acid (pH 6.0); abrupt wavy boundary.
2E/Bw—18 to 43 inches; E part (80 percent) is grayish brown (10YR 5/2) very cobbly sandy loam, light gray (10YR 7/2) dry, Bw part (20 percent) is brown (10YR 5/3) very cobbly sandy loam, very pale brown (10YR 7/3) dry; weak fine subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common fine, medium, and coarse roots; 30 percent gravel and 20 percent cobbles; slightly acid (pH 6.2); gradual wavy boundary.
2C—43 to 60 inches; grayish brown (10YR 5/2) extremely cobbly sandy loam, light gray (10YR 7/2) dry; massive; slightly hard, friable, nonsticky and slightly plastic; few medium and coarse roots; 40 percent gravel and 30 percent cobbles; slightly acid (pH 6.2)

## *Tallcreek Series*

**Taxonomic Class:** Coarse-silty, mixed, active, frigid Vitrandic Eutrudepts

### *Typical Pedon*

Tallcreek ashy silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed and slightly decomposed forest litter.
A—1 to 5 inches; gray (10YR 5/1) ashy silt loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium and many coarse roots; moderately acid (pH 6.0); gradual wavy boundary.
Bw—5 to 19 inches; light brownish gray (10YR 6/2) ashy silt loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium and few coarse roots; slightly alkaline (pH 7.6); gradual wavy boundary.
Bk—19 to 29 inches; light gray (5Y 7/2) silt loam, olive gray (5Y 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine masses of lime; slightly effervescent; slightly alkaline (pH 7.4); abrupt wavy boundary.
C1—29 to 35 inches; pale yellow (5Y 8/2) silty clay loam varved lacustrine material, light olive gray (5Y 6/2) moist; moderate medium platy structure; slightly hard, friable, moderately sticky and moderately plastic; few medium and coarse roots; slightly effervescent; slightly alkaline (pH 7.4); gradual wavy boundary.

C2—35 to 43 inches; pale yellow (5Y 8/2) silty clay loam varved lacustrine material, light olive gray (5Y 6/2) moist; massive; slightly hard, friable, moderately sticky and moderately plastic; common medium distinct yellowish brown (10YR 5/4) redox concentrations; slightly effervescent; slightly alkaline (pH 7.4); gradual wavy boundary.
C3—43 to 60 inches; pale yellow (5Y 8/2) very fine sandy loam varved lacustrine material, light olive gray (5Y 6/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common medium distinct yellowish brown (10YR 5/4) redox concentrations; slightly effervescent; slightly alkaline (pH 7.4).

## *Tamarack Series*

**Taxonomic Class:** Coarse-loamy, mixed, superactive, frigid Vitrandic Eutrudepts

### *Typical Pedon*

Tamarack ashy loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.
E—2 to 5 inches; light gray (10YR 7/2) ashy loam, grayish brown (10YR 5/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium and coarse roots; volcanic ash component; moderately acid (pH 6.0); clear wavy boundary.
Bw—5 to 14 inches; very pale brown (10YR 7/4) ashy loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium and coarse roots; slightly acid (pH 6.2); clear wavy boundary.
2E and Bt1—14 to 32 inches; E part (85 percent) is very pale brown (10YR 7/3) loamy sand, brown (10YR 5/3) moist, Bt part (15 percent) is brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist, broken discontinuous lamellae 1/8- to 1/4-inch thick; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium and few coarse roots; moderately acid (pH 6.0); gradual wavy boundary.
2E and Bt2—32 to 46 inches; E part (80 percent) is very pale brown (10YR 7/3) loamy coarse sand, brown (10YR 5/3) moist, Bt part (20 percent) is brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist, broken discontinuous lamellae 1/4- to 1/2-inch thick; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and coarse roots; moderately acid (pH 6.0); clear wavy boundary.
2C—46 to 60 inches; pale brown (10YR 6/3) loamy coarse sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; slightly acid (pH 6.2).

## *Tevis Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Dystric Eutrudepts

### *Typical Pedon*

Tevis very gravelly fine sandy loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; slightly decomposed forest litter.
E1—1 to 12 inches; light gray (10YR 7/2) gravelly loam, grayish brown (10YR 5/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse roots; 20 percent gravel and 10 percent cobbles; slightly acid (pH 6.2); clear wavy boundary.

E2—12 to 21 inches; pale yellow (2.5Y 7/3) very gravelly loam, light olive brown (2.5Y 5/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; 40 percent gravel and 10 percent cobbles; slightly acid (pH 6.4); gradual wavy boundary.
E/Bw—21 to 60 inches; E part (80 percent): pale yellow (2.5Y 7/3) extremely gravelly fine sandy loam, light yellowish brown (2.5Y 6/3) moist, B part (20 percent): light yellowish brown (2.5Y 6/3) extremely gravelly fine sandy loam, light olive brown (2.5Y 5/3) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; 60 percent gravel and 5 percent cobbles; slightly acid (pH 6.2).

## *Trumancreek Series*

**Taxonomic Class:** Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, nonacid, frigid Typic Endoaquepts

### *Typical Pedon*

Trumancreek loam (Colors are for dry soil unless otherwise noted.)

A—0 to 7 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak fine and medium subangular blocky structure parting to weak medium and coarse granular; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; common very fine and fine dendritic tubular pores; neutral (pH 6.8); clear wavy boundary.
Bw1—7 to 16 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse and few very coarse roots; common very fine and fine dendritic tubular pores; 5 percent gravel; neutral (pH 6.8); gradual wavy boundary.
Bw2—16 to 22 inches; light brownish gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) dry; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few distinct dark yellowish brown (10YR 4/4) redox concentrations; common fine, medium, and coarse and few very coarse roots; common very fine and fine dendritic tubular pores; 5 percent gravel; neutral (pH 6.8); clear wavy boundary.
C1—22 to 28 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; common prominent dark yellowish brown (10YR 4/6) redox concentrations; common fine and medium roots; common very fine and fine dendritic tubular pores; 10 percent gravel; neutral (pH 6.8); clear wavy boundary.
2C2—28 to 35 inches; light yellowish brown (2.5Y 6/3) extremely gravelly loamy coarse sand, light olive brown (2.5Y 5/3) moist; single grain; loose, nonsticky and nonplastic; many prominent dark yellowish brown (10YR 4/6) redox concentrations; common fine and medium roots; 50 percent gravel and 10 percent cobbles; neutral (pH 6.8); clear wavy boundary.
3Cg1—35 to 37 inches; gray (2.5Y 6/1) gravelly clay loam, dark gray (2.5Y 4/1) moist; hard, firm, moderately sticky and moderately plastic; common prominent dark yellowish brown (10YR 4/6) redox concentrations; few fine and medium roots; common very fine and fine dendritic tubular pores; 20 percent gravel; neutral (pH 7.0); clear wavy boundary.
4Cg2—37 to 60 inches; gray (5Y 6/1) extremely gravelly loamy coarse sand, dark gray (5Y 4/1) moist; single grain; loose, nonsticky and nonplastic; few fine and medium roots; 60 percent gravel and 10 percent cobbles; neutral (pH 7.2).

## *Waldbillig Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive Andic Haplocryepts

### *Typical Pedon*

Waldbillig gravelly ashy silt loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; slightly decomposed forest litter.
Bw—2 to 9 inches; light yellowish brown (10YR 6/4) gravelly ashy silt loam, dark yellowish brown (10YR 4/4) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium and coarse roots; 15 percent gravel; moderately acid (pH 6.0); clear wavy boundary.
2E1—9 to 20 inches; light gray (10YR 7/2) very gravelly fine sandy loam, grayish brown (10YR 5/2) moist; weak very fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine and fine and common medium and coarse roots; 40 percent gravel and 5 percent cobbles; slightly acid (pH 6.2); gradual wavy boundary.
2E2—20 to 34 inches; very pale brown (10YR 7/3) very gravelly fine sandy loam, pale brown (10YR6/3) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and few medium roots; 40 percent gravel and 10 percent cobbles; slightly acid (pH 6.2); gradual wavy boundary.
2E and Bt—34 to 60 inches; E part (70 percent): very pale brown (10YR 7/3) very gravelly fine sandy loam, pale brown (10YR6/3) moist, B part (30 percent): light yellowish brown (2.5Y 6/3) very gravelly fine sandy loam lamellae, light olive brown (2.5Y 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and few medium roots; 40 percent gravel, 10 percent cobbles, and 5 percent stones; slightly acid (pH 6.2).

## *Whitebear Series*

**Taxonomic Class:** Coarse-silty, mixed, superactive, frigid Typic Natrustalfs

### *Typical Pedon*

Whitebear silt loam (Colors are for dry soil unless otherwise noted.)

E1—0 to 4 inches; light gray (10YR 7/1) silt loam, gray (10YR 5/1) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, friable, nonsticky and slightly plastic; few fine and medium roots; strongly effervescent; moderately alkaline (pH 8.4); gradual wavy boundary.
E2—4 to 10 inches; light gray (10YR 7/2) silt loam, light brownish gray (10YR 6/2) moist; weak medium subangular blocky structure parting to moderate fine platy; slightly hard, friable, nonsticky and slightly plastic; few fine roots; strongly effervescent; very strongly alkaline (pH 9.5); gradual wavy boundary.
E/Btn—10 to 13 inches; E part (70 percent) light gray (10YR 7/2) silt loam, light brownish gray (10YR 6/2) moist; Bt part (30 percent) light brownish gray (2.5Y 6/2), dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate fine platy; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few distinct clay films on faces of peds; strongly effervescent; very strongly alkaline (pH 10.0); clear wavy boundary.
Btn—13 to 18 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common distinct clay films on

faces of peds; strongly effervescent; very strongly alkaline (pH 10.1); clear wavy boundary.
BC—18 to 23 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine distinct light olive brown (2.5Y 5/4) redox concentrations; strongly effervescent; very strongly alkaline (pH 10.1); gradual wavy boundary.
C1—23 to 40 inches; pale yellow (2.5Y 8/2) silt, light brownish gray (2.5Y 6/2) moist; massive; slightly hard, friable, nonsticky and slightly plastic; common fine distinct light olive brown (2.5Y 5/4) redox concentrations; strongly effervescent; very strongly alkaline (pH 10.2); gradual wavy boundary.
C2—40 to 56 inches; pale yellow (2.5Y 8/2) silt loam, pale yellow (2.5Y 7/4) moist; thin platy varves; hard, firm, moderately sticky and moderately plastic; common fine distinct light olive brown (2.5Y 5/4) redox concentrations; strongly effervescent; very strongly alkaline (pH 9.5); gradual wavy boundary.
C3—56 to 60 inches; pale yellow (2.5Y 8/2) very fine sandy loam, pale yellow (2.5Y 7/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; many fine distinct light olive brown (2.5Y 5/4) redox concentrations; slightly effervescent; moderately alkaline (pH 8.2).

## *Wildgen Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lamellic Haplustepts

### *Typical Pedon*

Wildgen gravelly loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch; undecomposed and slightly decomposed forest litter.
A—1 to 7 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; 20 percent gravel; neutral (pH 6.6); clear smooth boundary.
E1—7 to 18 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many fine and very fine roots; few fine tubular pores; 35 percent gravel; slightly acid (pH 6.2); clear wavy boundary.
E2—18 to 32 inches; light gray (10YR 7/1) very gravelly sandy loam, grayish brown (10YR 5/2) moist; weak coarse and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and medium roots; many fine and medium tubular pores; 35 percent gravel and 20 percent cobbles; slightly acid (pH 6.4); gradual wavy boundary.
E and Bt—32 to 60 inches; E part (75 percent) is light gray (10YR 7/1) very gravelly sandy loam, grayish brown (10YR 5/2) moist; B part (25 percent) is yellowish brown (10YR 5/4) very gravelly sandy loam lamellae 1/4- to 3/8-inch thick, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine and medium roots; many fine and medium tubular pores; 40 percent gravel and 10 percent cobbles; slightly acid (pH 6.2).

## *Wimper Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Typic Haplustolls

### *Typical Pedon*

Wimper gravelly loam, stony (Colors are for dry soil unless otherwise noted.)

A—0 to 7 inches; very dark grayish brown (10YR 3/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, very friable, slightly sticky and nonplastic; many very fine and fine and few medium roots; many very fine and fine pores; 20 percent gravel; neutral (pH 7.3); clear wavy boundary.
Bw—7 to 13 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many very fine and few fine and medium roots; many very fine and fine interstitial and tubular pores; 20 percent gravel; slightly alkaline (pH 7.6); clear wavy boundary.
Bk1—13 to 17 inches; brown (10YR 5/3) very gravelly loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common fine and few fine and medium roots; many very fine and fine interstitial and tubular pores; 35 percent gravel; many faint coats of lime on undersides of fragments; strongly effervescent; moderately alkaline (pH 8.2); clear wavy boundary.
Bk2—17 to 31 inches; very pale brown (10YR 8/2) very gravelly loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine and medium roots; many very fine and fine interstitial and tubular pores; 40 percent gravel; few very fine and fine masses and threads of lime, continuous distinct lime casts on undersides of fragments; violently effervescent; moderately alkaline (pH 8.3); gradual wavy boundary.
Bk3—31 to 60 inches; light gray (10YR 7/2) very gravelly loam, light brownish gray (10YR 6/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine interstitial and tubular pores; 55 percent gravel; few very fine and fine masses and threads of lime, continuous faint coats of lime on undersides of fragments; violently effervescent; moderately alkaline (pH 8.3).

## *Winfall Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lamellic Eutrudepts

### *Typical Pedon*

Winfall gravelly loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.
E—2 to 20 inches; pinkish gray (7.5YR 7/2) gravelly loam, brown (7.5YR 5/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine, and medium and few coarse roots; many very fine and fine pores; 25 percent gravel; strongly acid (pH 5.5); gradual smooth boundary.
E and Bt—20 to 60 inches; E part (80 percent) is pinkish gray (7.5YR 7/2) very gravelly loam, brown (7.5YR 5/2) moist; B part (20 percent) is brown (7.5YR 5/2) very fine sandy loam lamellae 1/8- to 3/8-inch thick, brown (7.5YR 4/4) moist; texture mixed is very gravelly loam, moderate medium subangular blocky structure; hard, friable, nonsticky and nonplastic; few fine and medium roots; few fine pores; 35 percent gravel and 10 percent cobbles; moderately acid (pH 6.0).

## *Winkler Series*

**Taxonomic Class:** Loamy-skeletal, mixed, superactive, frigid Lamellic Haplustepts

### *Typical Pedon*

Winkler very gravelly sandy loam (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches; undecomposed and slightly decomposed forest litter.

A—2 to 5 inches; grayish brown (10YR 5/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many fine pores; 40 percent angular gravel; slightly acid (pH 6.4); clear smooth boundary.

E1—5 to 10 inches; pinkish gray (7.5YR 6/2) very gravelly sandy loam, brown (7.5YR 5/2) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many fine pores; 40 percent angular gravel; slightly acid (pH 6.2); gradual wavy boundary.

E2—10 to 27 inches; pinkish gray (7.5YR 6/2) very gravelly sandy loam, brown (7.5YR 5/2) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine and medium roots; many fine pores; 45 percent angular gravel; slightly acid (pH 6.2); gradual wavy boundary.

E and Bt—27 to 44 inches; E part (75 percent) is pinkish gray (7.5YR 6/2) extremely gravelly sandy loam, brown (7.5YR 5/2) moist; B part (25 percent) is reddish gray (5YR 5/2) fine sandy loam lamellae 1/8- to 1/2-inch thick, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common very fine and fine pores; 50 percent angular gravel and 20 percent angular cobbles; moderately acid (pH 5.8); gradual wavy boundary.

C—44 to 60 inches; pinkish gray (7.5YR 6/2) extremely gravelly sandy loam, brown (7.5YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; few fine pores; 55 percent angular gravel and 20 percent angular cobbles; moderately acid (pH 5.6).

# Formation of the Soils

This section relates the soils in the survey area to the major factors of soil formation.

## Factors of Soil Formation

Soils form through weathering and other processes that act on deposited or accumulated geologic material. Although there are many different soils, the kind of soil that forms depends on the interaction of the type of parent material; the climate to which soil material has been exposed; the relief, or topology, of the land; the plant and animal life in and on the soil; and the length of time that these collective forces have interacted. These factors together are called the soil-forming factors.

The effects of climate and living organisms are conditioned by relief, which influences surface drainage; the amount of water that percolates through the soil; the rate of erosion; and the vegetation potential of the soil. The nature of the parent material also affects the nature of the soil profile that is formed. Time is needed for the climate and organisms to transform parent material into a soil. The development of a distinct soil horizon can require a long period.

The relative importance of each of these factors differs from place to place; in some areas, one factor is more important, and, in other areas, another may dominate. A modification or variation in any of the factors may result in a different kind of soil. Within short distances, the combination of these factors varies, and, consequently, the soils that form may differ in fertility, productivity, and physical and chemical characteristics. In the following paragraphs, the factors of soil formation are further discussed.

### Parent Material

Parent material is the initial physical body that is changed by the other soil-forming factors over time. It strongly affects the chemical and mineralogical composition of the soil. Generally, the influence of parent material diminishes gradually as a soil develops. The nature of the parent material expresses itself clearly in the soil profile, including color, texture, and mineralogy. These properties can be related to physical and chemical properties, susceptibility to erosion, shrink-swell potential, and inherent fertility.

The north and east parts of the survey area were glaciated. Soils formed in glacial till, glacial lake sediments, glacial outwash, or alluvium from these parent materials. Soils in unglaciated parts of the survey area formed from colluvium and residuum over quartzite, argillite, or welded tuff. Many soils throughout the survey area have volcanic ash in the surface layer. The Courville and Pleasantvalley series formed in silty glacial till derived primarily from quartzite and have a layer of volcanic ash on the surface. The Foyslake and McMannamy series formed in calcareous glacial till. The Ashleylake series formed in calcareous glacial till with minor amounts of volcanic ash in the surface layers. The Lynchlake series formed in glaciolacustrine sediments with minor amounts of volcanic ash in the surface layers. The Glaciercreek and Lesier series formed in glacial outwash with a layer of volcanic ash on the surface. The Barzee

series formed in organic materials. The Trumancreek and Idahocreek series formed in alluvium. The Mitten and Combest series formed in volcanic ash over colluvium derived from argillite and quartzite bedrock. The Battlebutte, Pashua, and Lozeau series formed in colluvium and residuum derived from semiconsolidated welded tuff.

## Climate

Climate as expressed in air and soil temperature, soil moisture states, and precipitation is an active force in the formation of soils. Climate affects soil formation through its impact on the kind and amount of living organisms in and on the soil. Vegetation and organisms decay to produce organic matter in the soil. Soils that have cool temperatures and high moisture levels generally contain more organic matter and are darker colored. Soils that have warm temperatures and low soil moisture generally contain less organic matter and are lighter colored.

Soils form from rocks that have been weathered by erosion and alternate freezing and thawing. Chemical reactions, such as solution and hydration, further break down this weathered material.

In the soil survey area, winters are cold; springs are cool and moist; and summers are warm and dry. The mean annual precipitation ranges from 14 to 60 inches. The mean annual temperature ranges from 36 to 46 degrees F.

## Topography

Topography, or relief, is determined by mountain formation and subsequent/concurrent related erosion and glaciation and by the age and resistance of geologic formations to erosion by wind and water. Topography influences soil development through its influence on effectiveness of precipitation, drainage, and runoff. The degree of slope, aspect, shape of the land surface, and permeability of the soil determine the rate of runoff, internal drainage, and soil moisture content.

Slope aspect has an impact on soil formation and related vegetation. East- and north-facing slopes receive less intense solar radiation. As a result, the soils on these slopes remain moister longer and are cooler than soils on west- and south-facing slopes. The surface soil is darker and the depth to lime is generally deeper on north-facing slopes than on south-facing slopes. In much of the survey area, these differences are pronounced.

## Living Organisms

Living organisms greatly influence the processes of soil formation and the soil characteristics. Plants, animals, insects, and microorganisms affect gains or losses in organic matter, plant nutrients in the soil, and changes in porosity and structure. The kinds and amounts of living organisms are influenced by soil-forming factors, such as climate and topography.

Roots, rodents, and insects penetrate the soil and alter its structure. The deep, fibrous root system of grasses improves the porosity and structure of the soil. Animal activity is largely concentrated in the upper layers of the soil. Because of this porosity, the activity of microbes, earthworms, and burrowing animals increases. Animals and insects, in turn, increase large channels and pores in the soil by deep burrowing, leaving open channels for the movement of water and air. The soil is continually mixed by this activity.

Plant roots create channels through which air and water move more rapidly, affecting soil structure and increasing the rate of chemical reactions. Deep roots transport minerals and plant nutrients to the surface, improving surface fertility. Under coniferous trees, needles accumulated at the surface increase the soil’s acidity.

Microorganisms decompose organic matter, which releases plant nutrients and chemicals into the soil. Some organisms in the soil take in nitrogen from the air and

incorporate it into plant tissues. After these organisms die, the nitrogen is released in various forms, becoming available to plants. These nutrients either are used by the plants or are leached from the soil. Human activities that influence plant and animal populations in the soil affect the rate of soil formation.

Soils under forest plant communities tend to be cooler than soils under grassland plant communities. Wet soils may have less oxygen available than better drainer soils.

Coniferous forest covers most of the soil survey area. The Pleasant Valley and Smith Valley parts of the soil survey area have significant wetlands and open forest and grassland. The southernmost part of the survey area bordering the Flathead Indian Reservation is open forest and grassland.

## Time

The length of time parent materials have been in place and exposed to climate and living organisms is generally reflected in the degree soils have developed. If soil-forming factors have been active for a long time, horizon development is stronger than if they have been active for a relatively short time, assuming a stable landscape. Horizons are described in terms of chemistry, color, consistence, permeability, structure, texture, and thickness.

Some parent materials weather faster than others do. The rate of weathering is dependent on the mineral composition and degree of consolidation and cementation of the parent material. “Time zero” for soil formation is considered the point in time when fresh parent material is first exposed to the soil-forming factors. Examples include a flood, a change in topography resulting from a geologic event, a severe episode of erosion, or the influence of humans on the landscape.

Soils are classified according to their degree of development, an approximation, or proxy, for age, from undeveloped to very old. Age, or maturity, of a soil is generally indicated by thickness and distinctness of subsurface horizons, content of organic matter and clay, depth to which soluble material is leached, and form and distribution of calcium carbonate and gypsum in the soil.

Young soils show very little profile development. Wetsand soils are considered young. They flood at regular frequencies. Therefore, the parent material is constantly renewed and in place only a short time. This soil has had little chance for accumulation of organic matter, and lack of stability results in minimal clay movement within the soil. The soil profile has thin strata of water-lain material that have been little altered, and the soil has lime at the surface.

The Anaconda soil formed in parent material similar to the parent material of the Wetsand soil, but it is on a more stable landform, so the surface is older. The surface layer is darker and thicker than Wetsand soils, and lime has leached to below the surface soil.

Upland soils are a mix of older and younger soils. The degree of soil development depends on landform position, stability, and composition of the parent material. The Bridger soil is an example of a mature, stable soil. It has extensive alteration of the subsoil. Fine clay particles have moved out of the surface soil and been deposited in the subsoil. Lime and soluble minerals have leached out of the subsoil and been redeposited below the subsoil. Passage of time has effected a great deal of change in the original water-lain parent material.

Many sloping and steep, shallow, and very shallow upland soils have been forming for about as long as some of the more developed, less-sloping, stable soils. However, erosion has removed the soil as fast as it formed. In this case, much of the effect of time has been countered by the effect of relief.

Figure 2 shows the extent of continental glaciation in the survey area. Soils in the glaciated northern and eastern parts of the survey area are relatively younger than soils in the nonglaciated southern part of the survey area.

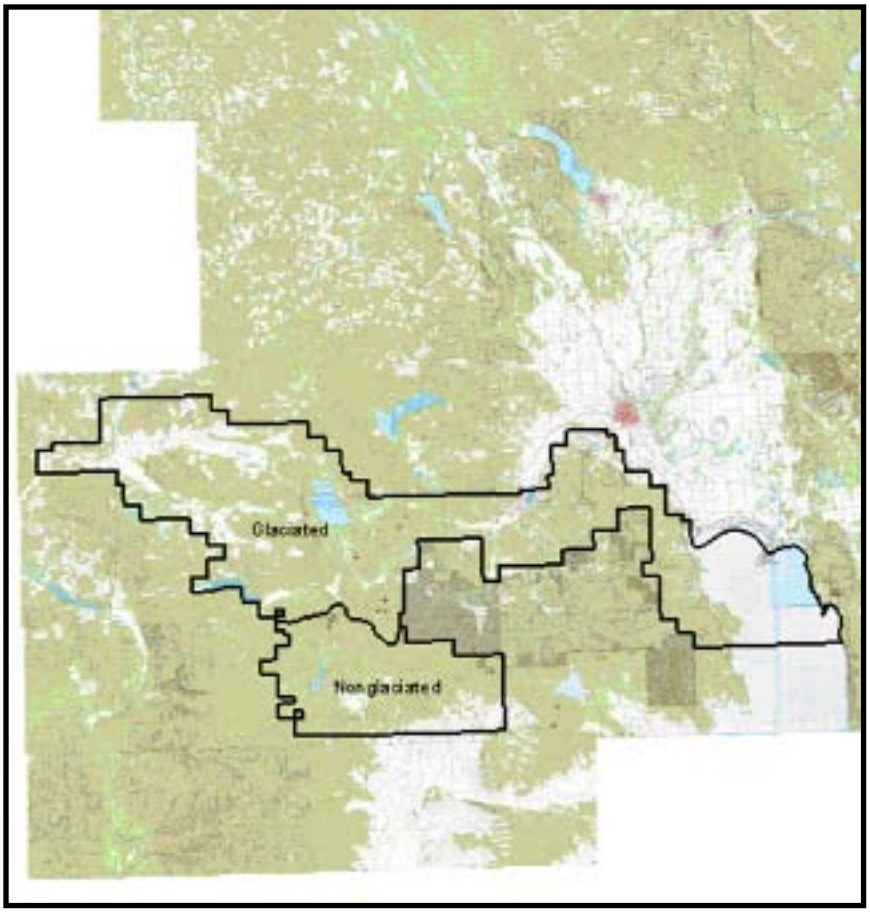


**Figure 2.—The extent of continental glaciation in the soil survey**

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# Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the *National Soil Survey Handbook* (available in local offices of the Natural Resources Conservation Service or on the Internet at http://soils.usda.gov/technical/handbook/).

**Ablation till.** Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

**Aeration, soil**. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

**Aggregate, soil**. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

**Alkali (sodic) soil**. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

**Alluvial fan**. A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes. It is shaped like an open fan or a segment of a cone. The material was deposited by a stream at the place where it issues from a narrow mountain valley or upland valley or where a tributary stream is near or at its junction with the main stream. The fan is steepest near its apex, which points upstream, and slopes gently and convexly outward (downstream) with a gradual decrease in gradient.

**Alluvium**. Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

**Alpha,alpha-dipyridyl**. A compound that when dissolved in ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction implies reducing conditions and the likely presence of Redox features.

**Angle of repose.** The maximum angle of slope (measured from a horizontal plane) at which loose, cohesionless material will come to rest.

**Animal-unit-month (AUM)**. The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

**Aquic conditions**. Current soil wetness characterized by saturation, reduction, and Redox features.

**Argillic horizon**. A subsoil horizon characterized by an accumulation of illuvial clay.

**Aspect**. The direction toward which a slope faces. Also called slope aspect.

**Association, soil**. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

**Available water capacity (available moisture capacity)**. The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at

wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low .....0 to 3
Low .....3 to 6
Moderate.....6 to 9
High .....9 to 12
Very High .....more than 12

**Avalanche chute.** The track or path formed by an avalanche.

**Backslope**. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

**Badland**. A landscape that is intricately dissected and characterized by a very fine drainage network with high drainage densities and short, steep slopes and narrow interfluves. Badlands develop on surfaces that have little or no vegetative cover overlying unconsolidated or poorly cemented materials (clays, silts, or sandstones) with, in some cases, soluble minerals, such as gypsum or halite.

**Basal area**. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

**Basal till.** Compact glacial till deposited beneath the ice.

**Base saturation**. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

**Base slope** (geomorphology). A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

**Bedding plane**. A planar or nearly planar bedding surface that visibly separates each successive layer of stratified sediment or rock (of the same or different lithology) from the preceding or following layer; a plane of deposition. It commonly marks a change in the circumstances of deposition and may show a parting, a color difference, a change in particle size, or various combinations of these. The term is commonly applied to any bedding surface, even one that is conspicuously bent or deformed by folding.

**Bedrock**. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

**Bedrock-controlled topography.** A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

**Bench terrace.** A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

**Blowout.** A saucer-, cup-, or trough-shaped depression formed by wind erosion on a preexisting dune or other sand deposit, especially in an area of shifting sand or loose soil or where protective vegetation is disturbed or destroyed; the adjoining accumulation of sand derived from the depression, where recognizable, is commonly included. Blowouts are commonly small.

**Board foot.** A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

**Bottom land**. An informal term loosely applied to various portions of a flood plain.

**Boulders**. Rock fragments larger than 2 feet (60 centimeters) in diameter.

**Bouldery.** Refers to a soil with .01 to 0.1 percent of the surface covered with boulders.

**Bouldery soil material.** Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments larger than 24 inches (60 centimeters) in diameter.

**Breaks**. A landscape or tract of steep, rough or broken land dissected by ravines and gullies and marking a sudden change in topography.

**Breast height**. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

**Brush management**. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

**Cable yarding**. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

**Calcareous soil**. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

**Caliche.** A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

**California bearing ratio (CBR).** The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

**Canopy**. The leafy crown of trees or shrubs. (See Crown.)

**Canyon**. A long, deep, narrow valley with high, precipitous walls in an area of high local relief.

**Capillary water**. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

**Catena.** A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material and under similar climatic conditions but that have different characteristics as a result of differences in relief and drainage.

**Cation**. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

**Cation-exchange capacity**. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

**Channeled.** Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material.

**Channery soil material**. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

**Chemical treatment**. Control of unwanted vegetation through the use of chemicals.

**Chiseling**. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

**Cirque**. A steep-walled, semicircular or crescent-shaped, half-bowl-like recess or hollow, commonly situated at the head of a glaciated mountain valley or high on the side of a mountain. It was produced by the erosive activity of a mountain glacier. It commonly contains a small round lake (tarn).

**Clay**. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

**Clay depletions.** See Redox features.

**Clayey soil.** Silty clay, sandy clay, or clay.

**Clay film**. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

**Claypan**. A dense, compact, slowly permeable subsoil layer that contains much more clay than the overlying materials, from which it is separated by a sharply defined boundary. A claypan is commonly hard when dry and plastic and sticky when wet.

**Clearcut.** A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from the adjacent stands.

**Climax plant community**. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

**Closed depression.** A low area completely surrounded by higher ground and having no natural outlet.

**Coarse textured soil**. Sand or loamy sand.

**Cobble** (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

**Cobbly soil material**. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

**Codominant trees.** Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

**COLE** (coefficient of linear extensibility). See Linear extensibility.

**Collapsed lake plain.** A lake plain formed on, and bounded by, glacial ice and subsequently “let down” or collapsed by the melting of underlying ice resulting in contortion or folding of the sediments and sedimentary structures. Lacustrine sediments cap present topography.

**Colluvium**. Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.

**Commercial forest.** Forestland capable of producing 20 cubic feet or more per acre per year at the culmination of mean annual increment.

**Complex slope**. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

**Complex, soil**. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

**Concretions**. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions. (See Redox features)

**Conglomerate**. A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

**Conservation cropping system**. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting

crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

**Conservation tillage**. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

**Consistence, soil**. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the *Soil Survey Manual*.

**Consolidated sandstone.** Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

**Consolidated shale.** Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

**Contour stripcropping (or contour farming).** Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

**Control section.** The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

**Coprogenous earth** (sedimentary peat). A type of limnic layer composed predominantly of fecal material derived from aquatic animals.

**Corrosion**. (soil survey interpretations). Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

**Cover crop**. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

**Crop residue management**. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

**Cropping system**. Growing crops according to a planned system of rotation and management practices.

**Cross-slope farming.** Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

**Crown**. The upper part of a tree or shrub, including the living branches and their foliage.

**Cryoturbate.** A mass of soil or other unconsolidated earthy material moved or disturbed by frost action. It is typically coarser than the underlying material.

**Culmination of the mean annual increment** (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

**Cutbanks cave** (in tables). The walls of excavations tend to cave in or slough.

**Decreasers**. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be diminished by overgrazing.

**Deep soil.** A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Deferred grazing**. Postponing grazing or resting grazing land for a prescribed period.

**Dense layer** (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

**Depression.** Any relatively sunken part of the earth's surface; especially a low-lying area surrounded by higher ground. A closed depression has no natural outlet for surface drainage (e.g., a sinkhole). An open depression has a natural outlet for surface drainage.

**Depth, soil**. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

**Depth to rock** (in tables)**.** Bedrock is too near the surface for the specified use.

**Diatomaceous earth.** A geologic deposit of fine, grayish siliceous material composed chiefly or entirely of the remains of diatoms.

**Dip slope**. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

**Diversion** (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

**Divided-slope farming.** A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

**Dominant trees.** Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

**Drainage class** (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the *Soil Survey Manual*.

**Drainage, surface**. Runoff, or surface flow of water, from an area.

**Drainageway**. A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have only a small defined channel.

**Draw.** A small stream valley that generally is shallower and more open than a ravine or gulch and that has a broader bottom. The present stream channel may appear inadequate to have cut the drainageway that it occupies.

**Drift**. A general term applied to all mineral material (clay, silt, sand, gravel, and boulders) transported by a glacier and deposited directly by or from the ice or transported by running water emanating from a glacier. Drift includes unstratified material (till) that forms moraines and stratified deposits that form outwash plains, eskers, kames, varves, and glaciofluvial sediments. The term is generally applied to Pleistocene glacial deposits in areas that no longer contain glaciers.

**Drumlin.** A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

**Duff.** A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and grades from litter on the surface to underlying humus.

**Draw**. A small stream valley that generally is shallower and more open than a ravine or gulch and that has a broader bottom. The present stream channel may appear inadequate to have cut the drainageway that it occupies.

**Dune.** A low mound, ridge, bank, or hill of loose, windblown granular material (generally sand), either barren and capable of movement from place to place or covered and stabilized with vegetation but retaining its characteristic shape.

**Earthy fill.** See Mine spoil.

**Ecological site**. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

**Eluviation**. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

**Endosaturation**. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

**Eolian deposit**. Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.

**Ephemeral stream**. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

**Episaturation**. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

**Erosion**. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

*Erosion* (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

*Erosion* (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or catastrophic in nature, such as fire, that exposes the surface.

**Erosion pavement.** A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

**Erosion surface.** A land surface shaped by the action of erosion, especially by running water.

**Escarpment**. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

**Esker.** A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels of a retreating glacier and that were left behind when the ice melted. Eskers range from less than a mile to more than 100 miles in length and from 10 to 100 feet in height.

**Even aged.** Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.

**Extrusive rock**. Igneous rock derived from deep-seated molten matter (magma) deposited and cooled on the earth's surface.

**Fallow**. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal

grain is grown. The soil is managed for at least one growing season for weed control and decomposition of plant residue.

**Fan remnant**. A general term for landforms that are the remaining parts of older fan landforms, such as alluvial fans, that have been either dissected or partially buried.

**Fertility, soil**. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

**Fibric soil material (peat)**. The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

**Field moisture capacity**. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called normal field capacity, normal moisture capacity, or capillary capacity.

**Fill slope.** A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

**Fine-textured soil**. Sandy clay, silty clay, or clay.

**Firebreak**. An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

**First bottom.** The normal flood plain of a stream, subject to frequent or occasional flooding.

**Flaggy soil material**. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

**Flagstone**. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

**Flood plain**. The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

**Flood-plain landforms.** A variety of constructional and erosional features produced by stream channel migration and flooding. Examples include backswamps, flood-plain splays, meanders, meander belts, meander scrolls, oxbow lakes, and natural levees.

**Flood-plain splay.** A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (commonly coarse grained) on the flood plain.

**Flood-plain step.** An essentially flat, terrace-like alluvial surface within a valley that is frequently covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of steps.

**Fluvial**. Of or pertaining to rivers or streams; produced by stream or river action.

**Foothills**. A region of steeply sloping hills that fringes a mountain range or high-plateau escarpment. The hills have relief of as much as 1,000 feet (300 meters).

**Footslope**. The concave surface at the base of a hillslope. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

**Forb**. Any herbaceous plant not a grass or a sedge.

**Forest cover**. All trees and other woody plants (underbrush) covering the ground in a forest.

**Forest type**. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

**Fragipan**. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

**Frost action** (in tables)**.** Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

**Genesis, soil**. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

**Giant ripple mark.** The undulating surface sculpture produced in noncoherent granular materials by currents of water and by the agitation of water in wave action during the draining of large glacial lakes, such as Glacial Lake Missoula.

**Gilgai.** Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

**Glacial drainage channel.** A channel formed by an ice-marginal, englacial, or subglacial stream during glaciation.

**Glacial drift.** Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

**Glacial lake.** (a) A lake that derives much or all of its water from the melting of glacial ice, fed by meltwater, and lying outside the glacial margins (e.g., a proglacial lake) or lying on a glacier (e.g., ice-walled lake, ice-floored lake) and due to differential melting. (b) A lake occupying a basin produced by glacial deposition, such as one held by a morainal dam. (c) a lake occupying a basin produced in bedrock by glacial erosion (scouring, quarrying); e.g., cirque lake, fjord. (d) A lake occupying a basin produced by collapse of outwash materials surrounding masses of stagnant ice. (e) [relict] An area formerly occupied by a glacial lake.

**Glacial outwash.** Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

**Glacial till.** Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

**Glacially scoured ridge.** Glacially scoured ridges are rounded mountain ridges that have been overridden by glaciers. Glacial scouring has resulted in areas of rock outcrop and in areas on the convex ridge crests where soils are shallow. Linear and concave areas have thicker deposits of glacial till.

**Glaciated mountain slope.** Mountain slopes mantled by glacial till.

**Glaciated uplands.** Land areas that were previously covered by continental or alpine glaciers and that are at a higher elevation than the flood plain.

**Glaciofluvial deposits.** Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur in the form of outwash plains, valley trains, deltas, kames, eskers, and kame terraces.

**Glaciolacustrine deposits.** Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are bedded or laminated.

**Gleyed soil**. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

**Grassed waterway**. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

**Gravel**. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

**Gravelly soil material**. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

**Grazeable forestland.** Land capable of sustaining livestock grazing by producing forage of sufficient quantity during one or more stages of secondary forest succession.

**Green manure crop** (agronomy). A soil-improving crop grown to be terminated in an early stage of maturity or soon after maturity.

**Ground water**. Water filling all the unblocked pores of the material below the water table.

**Gully.** A small channel with steep sides caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

**Gypsum.** A mineral consisting of hydrous calcium sulfate.

**Habitat type.** An aggregation of all land areas capable of producing similar climax plant communities.

**Hard bedrock**. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

**Hard to reclaim** (in tables). Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

**Hardpan**. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

**Head out**. To form a flower head.

**Head slope** (geomorphology). A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

**Heavy metal.** Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

**Hemic soil material** (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

**High-residue crops**. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

**Hill.** A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

**Hillslope.** A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.

**Horizon, soil**. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An

explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

*O horizon*.—An organic layer of fresh and decaying plant residue.

*A horizon*.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

*E horizon*.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

*B horizon*.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

*C horizon*.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

*Cr horizon*.—Soft, consolidated bedrock beneath the soil.

*R horizon*.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

**Humus**. The well decomposed, more or less stable part of the organic matter in mineral soils.

**Hydrologic soil groups**. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

**Igneous rock**. Rock that was formed by cooling and solidification of magma and that has not been changed appreciably by weathering since its formation. Major varieties include plutonic and volcanic rock (e.g., andesite, basalt, and granite).

**Illuviation**. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

**Impacted, moderately.** Moderately impacted soils generally have good ground coverage, but plant species present are mainly restricted to those tolerant of the effects of surface mining and smelting activities.

**Impacted, severely.** Severely impacted soils have substantial barren areas, and the plant species present are only those that can tolerate the extreme effects of surface mining and smelting activities.

**Impervious soil**. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

**Increasers**. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

**Infiltration**. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

**Infiltration capacity**. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

**Infiltration rate**. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

**Intake rate**. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2 ..... very low
0.2 to 0.4 ..... low
0.4 to 0.75 ..... moderately low
0.75 to 1.25 ..... moderate
1.25 to 1.75 ..... moderately high
1.75 to 2.5 ..... high
More than 2.5 ..... very high

**Interfluve**. A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

**Intermontane basin.** A generic term for wide structural depressions between mountain ranges that are partly filled with alluvium and called “valleys” in the vernacular. Intermontane basins may be drained internally (bolsons) or externally (semi-bolsons).

**Intermittent stream**. A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

**Invaders**. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Also, these plants invade following disturbance of the surface.

**Iron depletions.** See Redox features.

**Irrigation**. Application of water to soils to assist in production of crops. Methods of irrigation are:

*Basin*.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

*Border*.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

*Controlled flooding*.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

*Corrugation*.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

*Drip (or trickle)*.—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

*Furrow*.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

*Sprinkler*.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

*Subirrigation*.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

*Wild flooding*.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

**Jokulhlaup.** An Icelandic term for a glacial outburst flood, especially when an ice dam impounding a glacial lake breaks. Such breaks drained Glacial Lake Missoula and created the Channeled Scablands in the Pacific Northwest. (Pronounced: yo-kool-loup, the last syllable as in “out”)

**Kame.** A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

**Kame terrace.** A terracelike ridge consisting of stratified sand and gravel that were deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine and that remained after the disappearance of the ice. It is commonly pitted with kettles and has an irregular ice-contact slope.

**Knoll.** A small, low, rounded hill rising above adjacent landforms.

**$K_{sat}$**. Saturated hydraulic conductivity. (See Permeability.)

**Lacustrine deposit**. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

**Lake plain**. A nearly level surface marking the floor of an extinct lake filled by well sorted, generally fine textured, stratified deposits, commonly containing varves.

**Lake terrace**. A narrow shelf, partly cut and partly built, produced along a lakeshore in front of a scarp line of low cliffs and later exposed when the water level falls.

**Landslide**. A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

**Large stones** (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

**Lateral moraine.** A ridgelike moraine carried on and deposited at the side margin of a valley glacier. It is composed chiefly of rock fragments derived from the valley walls by glacial abrasion and plucking or by mass wasting.

**Leaching**. The removal of soluble material from soil or other material by percolating water.

**Linear extensibility**. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

**Liquid limit**. The moisture content at which the soil passes from a plastic to a liquid state.

**Loam**. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Loamy soil.** Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

**Loess**. Material transported and deposited by wind and consisting dominantly of silt-sized particles.

**Low-residue crops.** Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

**Low strength**. The soil is not strong enough to support loads.

**Marl**. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions; formed primarily under freshwater lacustrine conditions but also formed in more saline environments.

**Mass movement.** A generic term for the dislodgment and downslope transport of soil and rock material as a unit under direct gravitational stress.

**Masses.** Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redox concentration.(See Redox features.)

**Mean annual increment (MAI).** The average annual increase in volume of a tree during its entire life.

**Meander belt.** The zone within which migration of a meandering channel occurs; the flood-plain area included between two imaginary lines drawn tangential to the outer bends of active channel loops.

**Mechanical treatment**. Use of mechanical equipment for seeding, brush management, and other management practices.

**Medium-textured soil**. Very fine sandy loam, loam, silt loam, or silt.

**Merchantable trees.** Trees that are of sufficient size to be economically processed into wood products.

**Mesa.** A broad, nearly flat topped and commonly isolated landmass bounded by steep slopes or precipitous cliffs and capped by layers of resistant, nearly horizontal rocky material. The summit width is characteristically greater than the height of the bounding escarpments.

**Metamorphic rock**. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth's crust. Nearly all such rocks are crystalline.

**Microhigh.** An area that is 2 to 12 inches higher than the adjacent microlow.

**Microlow.** An area that is 2 to 12 inches lower than the adjacent microhigh.

**Mine spoil**. An accumulation of displaced earthy material, rock, or other waste material removed during mining or excavation. Also called earthy fill.

**Mineral soil**. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

**Minimum tillage**. Only the tillage essential to crop production and prevention of soil damage.

**Miscellaneous area**. A kind of map unit component that has little or no natural soil and supports little or no vegetation.

**Miscellaneous water**. A sewage lagoon, an industrial waste pit, a fish hatchery, or a similar water area.

**Moderately coarse-textured soil**. Coarse sandy loam, sandy loam, or fine sandy loam.

**Moderately deep soil.** A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Moderately fine-textured soil**. Clay loam, sandy clay loam, or silty clay loam.

**Mollic epipedon**. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

**Moraine**. In terms of glacial geology, a mound, ridge, or other topographically distinct accumulation of unsorted, unstratified drift, predominantly till, deposited primarily by the direct action of glacial ice in a variety of landforms. Also, a general term for a landform composed mainly of till (except for kame moraines, which are composed mainly of stratified outwash) that has been deposited by a glacier. Some types of moraines are disintegration, end, ground, kame, lateral, recessional, and terminal.

**Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

**Mottling, soil.** Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—few, common, and many; size—fine, medium, and coarse; and contrast—faint, distinct, and prominent. The size measurements are of the diameter along the greatest dimension. Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and coarse, more than 15 millimeters (about 0.6 inch).

**Mountain**. A generic term for an elevated area of the land surface, rising more than 1,000 feet (300 meters) above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are formed primarily by tectonic activity and/or volcanic action but can also be formed by differential erosion.

**Mountain slope.** A part of a mountain between the summit and the foot.

**Muck**. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

**Mudstone**. A blocky or massive, fine grained sedimentary rock in which the proportions of clay and silt are approximately equal. Also, a general term for such material as clay, silt, claystone, siltstone, shale, and argillite and that should be used only when the amounts of clay and silt are not known or cannot be precisely identified.

**Munsell notation**. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

**Natric horizon**. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

**Naturalized pasture.** Forestland that is used primarily for the production of forage for grazing by livestock rather than for the production of wood products. Overstory trees are removed or managed to promote the native and introduced understory vegetation occurring on the site. This vegetation is managed for its forage value through the use of grazing management principles.

**Neutral soil**. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

**Nodules.** See Redox features.

**Nose slope** (geomorphology). A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (e.g., slope alluvium).

**Nunatak.** An isolated hill, knob, ridge, or peak of bedrock that projects prominently above the surface of a glacier and is completely surrounded by glacial ice.

**Nutrient, plant**. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

**Observed rooting depth.** Depth to which roots have been observed to penetrate.

**Organic matter**. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

| | |
|---|---|
| Very low | less than 0.5 percent |
| Low | 0.5 to 1.0 percent |
| Moderately low | 1.0 to 2.0 percent |
| Moderate | 2.0 to 4.0 percent |
| High | 4.0 to 8.0 percent |
| Very high | more than 8.0 percent |

**Outwash**. Stratified and sorted sediments (chiefly sand and gravel) removed or "washed out" from a glacier by meltwater streams and deposited in front of or beyond the end moraine or the margin of a glacier. The coarser material is deposited nearer to the ice.

**Outwash fan.** A fan-shaped accumulation of outwash deposited by meltwater streams in front of the end or recessional moraine of a glacier. Coalescing outwash fans form an outwash plain.

**Outwash plain**. An extensive lowland area of coarse textured glaciofluvial material. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

**Outwash terrace.** A flat-topped bank of outwash with an abrupt outer face (scarp or riser) extending along a valley downstream from an outwash plain or terminal moraine; a valley train deposit.

**Overstory.** The trees in a forest that form the upper crown cover.

**Oxbow.** The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

**Paleoterrace.** An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

**Pan**. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan*, and *traffic pan*.

**Parent material**. The unconsolidated organic and mineral material in which soil forms.

**Peat**. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

**Ped**. An individual natural soil aggregate, such as a granule, a prism, or a block.

**Pedisediment.** A layer of sediment, eroded from the shoulder and backslope of an erosional slope, that lies on and is being (or was) transported across a gently sloping erosional surface at the foot of a receding hill or mountain slope.

**Pedon**. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

**Percolation**. The movement of water through the soil.

**Permafrost.** Ground, soil, or rock that remains at or below 0 degrees C for at least 2 years. It is defined on the basis of temperature and is not necessarily frozen.

**Permeability**. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the *Soil Survey Manual*. In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability."

Terms describing permeability, measured in inches per hour, are as follows:

| | |
|---|---|
| Impermeable | less than 0.0015 inch |
| Very slow | 0.0015 to 0.06 inch |
| Slow | 0.06 to 0.2 inch |
| Moderately slow | 0.2 to 0.6 inch |
| Moderate | 0.6 inch to 2.0 inches |
| Moderately rapid | 2.0 to 6.0 inches |
| Rapid | 6.0 to 20 inches |
| Very rapid | more than 20 inches |

**pH value**. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

**Phase, soil**. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

**Piping** (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

**Pitting** (in tables). Pits caused by melting around ice. They form on the soil after plant cover is removed.

**Plastic limit**. The moisture content at which a soil changes from semisolid to plastic.

**Plasticity index**. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

**Plateau** (geomorphology). A comparatively flat area of great extent and elevation; specifically, an extensive land region that is considerably elevated (more than 100 meters) above the adjacent lower lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level.

**Playa**. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressions, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff. Playa deposits are fine grained and may or may not have a high water table and saline conditions.

**Plowpan**. A compacted layer formed in the soil directly below the plowed layer.

**Ponding**. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

**Poorly graded**. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

**Pore linings.** See Redox features.

**Potential native plant community (PNC).** The biotic community that would become established on an ecological site if all successional sequences were completed without interferences by man under the present environmental conditions. Natural disturbances are inherent in its development. The PNC may include acclimatized or naturalized nonnative species. (See Climax plant community.)

**Potential rooting depth** (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

**Prescribed burning**. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

**Productivity, soil**. The capability of a soil for producing a specified plant or sequence of plants under specific management.

**Profile, soil**. A vertical section of the soil extending through all its horizons and into the parent material.

**Proper grazing use**. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

**Quartzite, metamorphic.** Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

**Quartzite, sedimentary.** Very hard but unmetamorphosed sandstone consisting chiefly of quartz grains.

**Range condition.** The present composition of the plant community on a range site in relation to the potential natural plant community for that site. (See Similarity index.)

**Range site.** (See Ecological site.)

**Rangeland**. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

**Reaction, soil**. A measure of acidity or alkalinity of a soil, expressed as pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

| | |
|---|---|
| Ultra acid | less than 3.5 |
| Extremely acid | 3.5 to 4.4 |
| Very strongly acid | 4.5 to 5.0 |
| Strongly acid | 5.1 to 5.5 |
| Moderately acid | 5.6 to 6.0 |
| Slightly acid | 6.1 to 6.5 |
| Neutral | 6.6 to 7.3 |
| Slightly alkaline | 7.4 to 7.8 |
| Moderately alkaline | 7.9 to 8.4 |
| Strongly alkaline | 8.5 to 9.0 |
| Very strongly alkaline | 9.1 and higher |

**Recessional moraine.** A moraine formed during a temporary but significant halt in the retreat of a glacier.

**Red beds**. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

**Redox concentrations.** See Redox features.

**Redox depletions.** See Redox features.

**Redox features**. Redox features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in Redox features that are defined as follows:

1. Redox concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:
   A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; *and*
   B. Masses, which are noncemented concentrations of substances within the soil matrix; *and*
   C. Pore linings, i.e., zones of accumulation along pores that may be either coats on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redox depletions.—These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
   A. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; *and*
   B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coats or skeletans).

3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

**Reduced matrix.** See Redox features.

**Regeneration.** The new growth of a natural plant community, developing from seed.

**Regolith**. All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.

**Relict stream terrace.** One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

**Relief**. The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

**Residuum** (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as bedrock weathers in place.

**Rill**. A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.

**Riser**. The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

**Riverwash.** Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

**Road cut**. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

**Rock fragments**. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, gravel, cobbles, stones, and boulders.

**Rock outcrop.** Exposures of bare bedrock other than lava flows and rock-lined pits.

**Root zone.** The part of the soil that can be penetrated by plant roots.

**Rubble land.** Areas that have more than 90 percent of the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. The areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders left by Pleistocene glaciation or by periglacial phenomena.

**Runoff**. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without soaking into the soil is called surface runoff.

**Saline soil**. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

**Salinity.** The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

| | |
|---|---|
| Nonsaline | 0 to 4 |
| Slightly saline | 4 to 8 |
| Moderately saline | 8 to 16 |
| Strongly saline | more than 16 |

**Sand**. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

**Sandstone**. Sedimentary rock containing dominantly sand-sized particles.

**Sandy soil.** Sand or loamy sand.

**Sapric soil material** (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

**Saturated hydraulic conductivity ($K_{sat}$).** See Permeability.

**Saturation.** Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

**Sawlogs.** Logs of suitable size and quality for the production of lumber.

**Scarification**. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

**Scribner's log rule.** A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

**Sedimentary plain.** An extensive nearly level to gently rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

**Sedimentary rock**. A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

**Sedimentary uplands.** Land areas of bedrock formed from water- or wind-deposited sediments. They are higher on the landscape than the flood plain.

**Seepage** (in tables)**.** The movement of water through soil. Seepage adversely affects the specified use.

**Semiconsolidated sedimentary beds.** Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

**Sequum**. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

**Series, soil**. A group of soils that have profiles that are almost alike. All the soils of a given series have horizons that are similar in composition, thickness, and arrangement.

**Shale**. Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

**Shallow soil.** A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Sheet erosion**. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

**Shelterwood system.** A forest management system requiring the removal of a stand in a series of cuts so that regeneration occurs under a partial canopy. After regeneration, a final cut removes the shelterwood and allows the stand to develop in the open as an even-aged stand. The system is well suited to sites where shelter is needed for regeneration, and it can aid regeneration of the more intolerant tree species in a stand.

**Shoulder**. The convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.

**Shrink-swell** (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

**Side slope** (geomorphology). A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

**Silica**. A combination of silicon and oxygen. The mineral form is called quartz.

**Silica-sesquioxide ratio.** The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

**Silt**. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**Siltstone**. An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.

**Similar soils**. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

**Similarity index.** A similarity index is the percentage of a specific vegetation state plant community that is presently on the site.

**Sinkhole**. A closed, circular or elliptical depression, commonly funnel shaped, characterized by subsurface drainage and formed either by dissolution of the surface of underlying bedrock (e.g., limestone, gypsum, or salt) or by collapse of underlying caves within bedrock. Complexes of sinkholes in carbonate-rock terrain are the main components of karst topography.

**Site class.** A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

**Site curve (50-year).** A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 50 years old or are 50 years old at breast height.

**Site curve (100-year).** A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 100 years old or are 100 years old at breast height.

**Site index**. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

**Skid trails.** Pathways along which logs are dragged to a common site for loading onto a logging truck.

**Slash.** The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

**Slickens.** Accumulations of fine textured material, such as material separated in placer-mine and ore-mill operations. Slickens from ore mills commonly consist of freshly ground rock that has undergone chemical treatment during the milling process.

**Slickensides** (pedogenic). Grooved, striated, and/or glossy (shiny) slip faces on structural peds, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.

**Slickspot.** A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is loamy or clayey, is slippery when wet, and is low in productivity.

**Slope**. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus,

a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

| | |
|---|---|
| Nearly level | 0 to 2 percent |
| Gently sloping | 2 to 4 percent |
| Moderately sloping | 4 to 8 percent |
| Strongly sloping | 8 to 15 percent |
| Moderately steep | 15 to 25 percent |
| Steep | 25 to 45 percent |
| Very steep | more than 45 percent |

**Slope** (in tables)**.** Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

**Slope alluvium**. Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded gravel or cobbles distinguish these materials from unsorted colluvial deposits.

**Slow intake** (in tables). The slow movement of water into the soil.

**Slow refill** (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

**Sodic (alkali) soil**. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

**Sodicity**. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na+ to Ca+ + Mg+. The degrees of sodicity and their respective ratios are:

| | |
|---|---|
| Slight | less than 13:1 |
| Moderate | 13-30:1 |
| Strong | more than 30:1 |

**Sodium adsorption ratio** (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

**Soft bedrock**. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

**Soil**. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

**Soil separates**. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

| | |
|---|---|
| Very coarse sand | 2.0 to 1.0 |
| Coarse sand | 1.0 to 0.5 |
| Medium sand | 0.5 to 0.25 |
| Fine sand | 0.25 to 0.10 |
| Very fine sand | 0.10 to 0.05 |
| Silt | 0.05 to 0.002 |
| Clay | less than 0.002 |

**Solum**. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons.

Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

**Species.** A single, distinct kind of plant or animal having certain distinguishing characteristics.

**Stone line**. In a vertical cross section, a line formed by scattered fragments or a discrete layer of angular and subangular rock fragments (commonly a gravel- or cobble-sized lag concentration) that formerly was draped across a topographic surface and was later buried by additional sediments. A stone line generally caps material that was subject to weathering, soil formation, and erosion before burial. Many stone lines seem to be buried erosion pavements, originally formed by sheet and rill erosion across the land surface.

**Stones**. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

**Stony**. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

**Stony soil material.** Soil that is 15 to 35 percent, by volume, rock fragments that are dominated by fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

**Strath terrace**. A type of stream terrace; formed as an erosional surface cut on bedrock and thinly mantled with stream deposits (alluvium).

**Stream channel.** The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

**Stream terrace.** One of a series of surfaces in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

**Stripcropping.** Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

**Structure, soil**. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

**Stubble mulch**. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

**Subsoil**. Technically, the B horizon; roughly, the part of the solum below plow depth.

**Subsoiling**. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

**Substratum**. The part of the soil below the solum.

**Subsurface layer**. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

**Summer fallow**. Management of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

**Summit**. The topographically highest position of a hillslope. It has a nearly level (planar or slightly convex) surface.

**Surface layer**. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

**Surface soil.** The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

**Tailwater.** The water directly downstream of a structure.

**Talus**. Rock fragments of any size or shape (commonly coarse and angular) derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose broken rock formed chiefly by falling, rolling, or sliding.

**Taxadjuncts.** Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

**Terminal moraine**. An end moraine that marks the farthest advance of a glacier. It typically has the form of a massive arcuate or concentric ridge, or complex of ridges, and is underlain by till and other types of drift.

**Terrace (geomorphology)**. A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

**Terracettes**. Small, irregular steplike forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may be induced or enhanced by trampling of livestock, such as sheep or cattle.

**Texture, soil**. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

**Thin layer** (in tables). Otherwise suitable soil material that is too thin for the specified use.

**Till**. Dominantly unsorted and nonstratified drift, generally unconsolidated and deposited directly by a glacier without subsequent reworking by meltwater, and consisting of a heterogeneous mixture of clay, silt, sand, gravel, stones, and boulders; rock fragments of various lithologies are embedded within a finer matrix that can range from clay to sandy loam.

**Till plain.** An extensive, nearly level to gently rolling or moderately sloping area that is underlain by or consists of till and that has a slope of 0 to 8 percent.

**Tilth, soil.** The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

**Toeslope**. The gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

**Topsoil**. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

**Trace elements**. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

**Trafficability.** The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

**Tread**. The flat to gently sloping, topmost, laterally extensive slope of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.

**Tuff**. A generic term for any consolidated or cemented deposit that is 50 percent or more volcanic ash.

**Understory.** Any plants in a forest community that grow to a height of less than 5 feet.

**Upland**. An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

**Valley.** An elongated depressional area primarily developed by stream action.

**Valley fill**. The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) so as to fill or partly fill a valley.

**Variegation**. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

**Varve**. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

**Very deep soil.** A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Very shallow soil.** A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Volcanic ash.** Unconsolidated, pyroclastic material less than 2 mm in all dimensions.

**Water bars**. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

**Water-spreading.** Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

**Weathering**. All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.

**Well graded**. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

**Wilting point** (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

**Windthrow.** The uprooting and tipping over of trees by the wind.

# Tables

**Freeze Dates in Spring and Fall**

**(Recorded in the period 1971 through 2000 at Olney, MT6218)**

| Probability | Temperature | | |
|---|---|---|---|
| | 24 degrees F or lower | 28 degrees F or lower | 32 degrees F or lower |
| Last freezing temperature in spring: January-July | | | |
| 1 year in 10 later than---- | May 25 | June 22 | July 16 |
| 2 years in 10 later than--- | May 20 | June 15 | July 9 |
| 5 years in 10 later than--- | May 11 | June 2 | June 26 |
| First freezing temperature in fall: August-December | | | |
| 1 year in 10 earlier than-- | September 7 | August 24 | August 11 |
| 2 years in 10 earlier than- | September 13 | August 29 | August 15 |
| 5 years in 10 earlier than- | September 23 | September 7 | August 24 |

**Freeze Dates in Spring and Fall**

**(Recorded in the period 1971 through 2000 at Libby 32 SSE, MT5020)**

| Probability | Temperature | | |
|---|---|---|---|
| | 24 degrees F or lower | 28 degrees F or lower | 32 degrees F or lower |
| Last freezing temperature in spring: January-July | | | |
| 1 year in 10 later than---- | May 29 | July 9 | August 2 |
| 2 years in 10 later than--- | May 22 | June 30 | July 24 |
| 5 years in 10 later than--- | May 10 | June 13 | July 8 |
| First freezing temperature in fall: August-December | | | |
| 1 year in 10 earlier than-- | August 30 | August 16 | July 29 |
| 2 years in 10 earlier than- | September 6 | August 22 | August 4 |
| 5 years in 10 earlier than- | September 19 | September 2 | August 17 |

**Growing Season**

**(Recorded in the period 1971 through 2000 at Olney, MT6218)**

| Probability | Daily minimum temperature | | |
|---|---|---|---|
| | Higher than 24 degrees F | Higher than 28 degrees F | Higher than 32 degrees F |
| | *Days* | *Days* | *Days* |
| 9 years in 10 | 109 | 69 | 37 |
| 8 years in 10 | 117 | 78 | 44 |
| 5 years in 10 | 133 | 96 | 56 |
| 2 years in 10 | 149 | 113 | 69 |
| 1 year in 10 | 157 | 123 | 76 |

**Growing Season**

**(Recorded in the period 1971 through 2000 at Libby 32 SSE, MT5020)**

| Probability | Daily minimum temperature | | |
|---|---|---|---|
| | Higher than 24 degrees F | Higher than 28 degrees F | Higher than 32 degrees F |
| | *Days* | *Days* | *Days* |
| 9 years in 10 | 98 | 45 | 0 |
| 8 years in 10 | 109 | 57 | 13 |
| 5 years in 10 | 131 | 81 | 40 |
| 2 years in 10 | 153 | 104 | 66 |
| 1 year in 10 | 165 | 117 | 80 |

## Temperature and Precipitation

**(Recorded in the period 1971 through 2000 at Olney, MT6218)**

| Month | Temperature (degrees F) | | | | | Precipitation (inches) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average daily maximum | Average daily minimum | Average | 2 years in 10 will have— Maximum temperature more than | 2 years in 10 will have— Minimum temperature less than | Average number of growing-degree days* | Average | 2 years in 10 will have— less than | 2 years in 10 will have— more than | Average number of days with 0.10 or more | Average Total Snowfall |
| January--- | 29.2 | 12.7 | 21.0 | 46 | -26 | 0 | 2.47 | 1.33 | 3.51 | 7 | 30.0 |
| February-- | 36.1 | 14.3 | 25.2 | 53 | -28 | 1 | 2.06 | 0.96 | 3.11 | 5 | 18.3 |
| March----- | 44.9 | 21.4 | 33.1 | 63 | -8 | 8 | 1.41 | 0.65 | 2.10 | 5 | 9.9 |
| April----- | 56.2 | 27.2 | 41.7 | 78 | 10 | 103 | 1.39 | 0.72 | 2.04 | 4 | 2.1 |
| May------- | 65.8 | 34.6 | 50.2 | 87 | 20 | 319 | 2.34 | 1.09 | 3.27 | 7 | 0.0 |
| June------ | 72.9 | 40.7 | 56.8 | 91 | 27 | 504 | 2.74 | 1.35 | 4.14 | 7 | 0.2 |
| July------ | 80.3 | 43.5 | 61.9 | 96 | 31 | 675 | 1.89 | 0.73 | 3.00 | 5 | 0.0 |
| August---- | 80.6 | 42.2 | 61.4 | 95 | 29 | 664 | 1.50 | 0.55 | 2.41 | 4 | 0.0 |
| September- | 69.4 | 34.0 | 51.7 | 88 | 18 | 356 | 1.25 | 0.37 | 2.03 | 3 | 0.1 |
| October--- | 54.7 | 26.8 | 40.7 | 75 | 8 | 94 | 1.44 | 0.48 | 2.39 | 4 | 1.7 |
| November-- | 36.7 | 21.3 | 29.0 | 57 | -10 | 6 | 2.38 | 1.16 | 3.63 | 6 | 17.6 |
| December-- | 27.7 | 13.3 | 20.5 | 44 | -24 | 0 | 2.23 | 1.07 | 3.40 | 6 | 31.6 |
| Yearly: | | | | | | | | | | | |
| Average-- | 54.5 | 27.7 | 41.1 | ——— | ——— | ——— | ——— | ——— | ——— | ——— | ——— |
| Extreme-- | 101.0 | -44.0 | ——— | 97 | -34 | ——— | ——— | ——— | ——— | ——— | ——— |
| Total---- | ——— | ——— | ——— | ——— | ——— | 2,729 | 23.08 | 16.49 | 27.00 | 63 | 111.5 |
| Average # of days per year with at least 1 inch of snow on the ground: 69 | | | | | | | | | | | |

* A growing-degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

**Temperature and Precipitation**

**(Recorded in the period 1971 through 2000 at Libby 32 SSE, MT5020)**

| | Temperature (degrees F) | | | | | Precipitation (inches) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2 years in 10 will have— | | | | 2 years in 10 will have— | | | |
| Month | Average daily maximum | Average daily minimum | Average | Maximum temperature more than | Minimum temperature less than | Average number of growing-degree days* | Average | less than | more than | Average number of days with 0.10 or more | Average Total Snowfall |
| January--- | 30.2 | 13.2 | 21.7 | 48 | -24 | 0 | 2.80 | 1.14 | 4.19 | 8 | 21.6 |
| February-- | 36.0 | 15.9 | 26.0 | 52 | -25 | 1 | 2.21 | 0.94 | 3.27 | 6 | 15.5 |
| March----- | 44.0 | 21.8 | 32.9 | 62 | -5 | 6 | 1.83 | 0.97 | 2.59 | 6 | 11.8 |
| April----- | 54.0 | 27.2 | 40.6 | 77 | 11 | 83 | 1.49 | 0.84 | 2.14 | 5 | 4.6 |
| May------- | 63.1 | 33.2 | 48.1 | 84 | 20 | 258 | 2.16 | 1.13 | 3.04 | 6 | 0.7 |
| June------ | 70.2 | 39.0 | 54.6 | 89 | 25 | 437 | 2.23 | 0.99 | 3.49 | 6 | 0.1 |
| July------ | 77.8 | 41.2 | 59.5 | 93 | 28 | 603 | 1.22 | 0.41 | 2.01 | 3 | 0.0 |
| August---- | 78.3 | 40.1 | 59.2 | 94 | 26 | 596 | 1.24 | 0.46 | 2.02 | 3 | 0.2 |
| September- | 68.0 | 32.9 | 50.4 | 88 | 16 | 320 | 1.30 | 0.57 | 2.00 | 4 | 0.1 |
| October--- | 54.4 | 26.5 | 40.4 | 77 | 5 | 95 | 1.82 | 0.63 | 3.01 | 5 | 2.7 |
| November-- | 37.0 | 21.1 | 29.0 | 58 | -10 | 8 | 3.06 | 1.67 | 4.45 | 9 | 16.1 |
| December-- | 29.4 | 14.0 | 21.7 | 46 | -22 | 0 | 2.95 | 1.40 | 4.36 | 8 | 22.6 |
| Yearly: | | | | | | | | | | | |
| Average-- | 53.5 | 27.2 | 40.3 | ——— | ——— | ——— | ——— | ——— | ——— | ——— | ——— |
| Extreme-- | 96.0 | -43.0 | ——— | 95 | -33 | ——— | ——— | ——— | ——— | ——— | ——— |
| Total---- | ——— | ——— | ——— | ——— | ——— | 2,408 | 24.30 | 19.72 | 28.09 | 69 | 96.1 |
| Average # of days per year with at least 1 inch of snow on the ground: 136 | | | | | | | | | | | |

* A growing-degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

# Accessibility Statement

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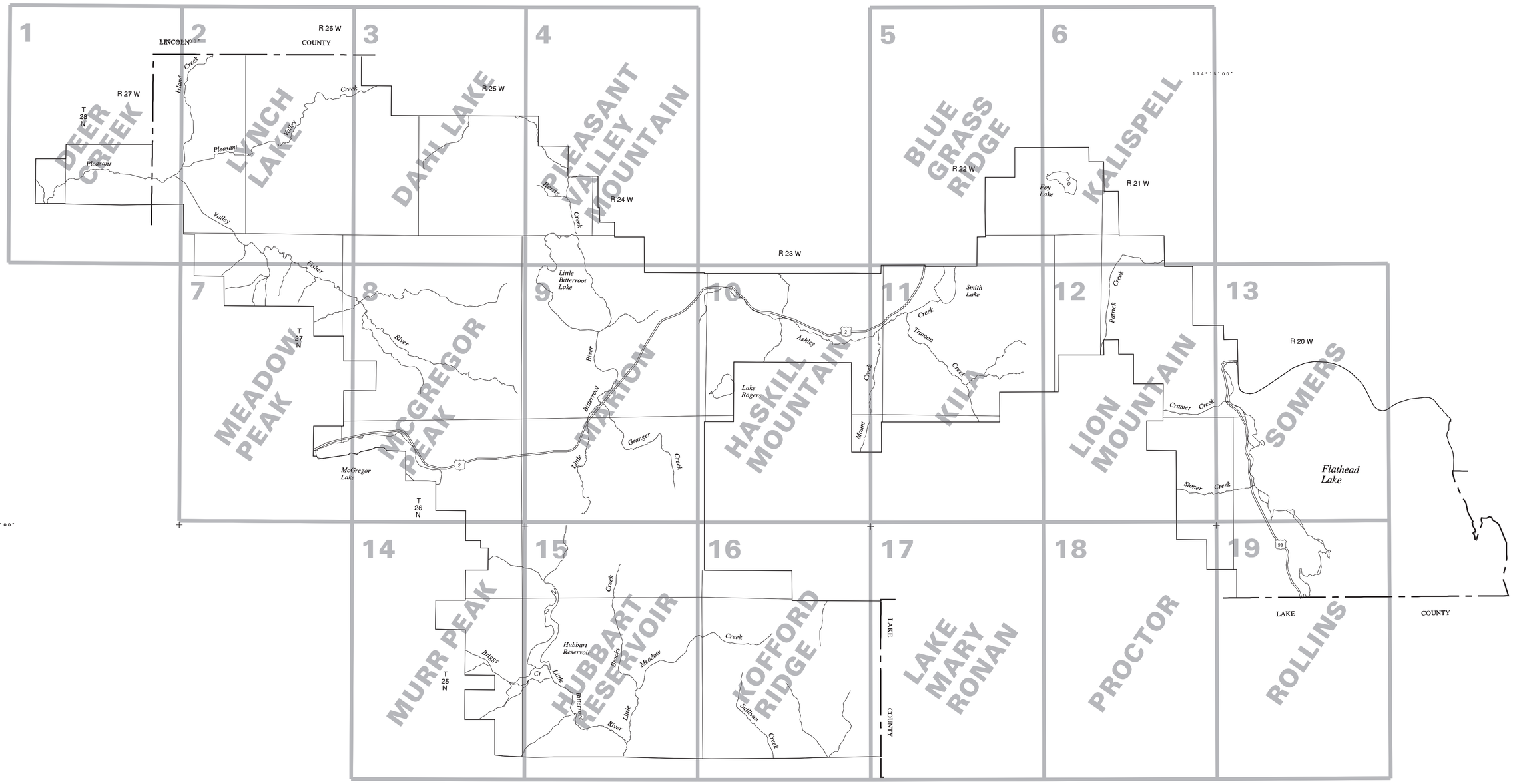
N

**SECTIONALIZED TOWNSHIP**

| | | | | | |
|---|---|---|---|---|---|
| 6 | 5 | 4 | 3 | 2 | 1 |
| 7 | 8 | 9 | 10 | 11 | 12 |
| 18 | 17 | 16 | 15 | 14 | 13 |
| 19 | 20 | 21 | 22 | 23 | 24 |
| 30 | 29 | 28 | 27 | 26 | 25 |
| 31 | 32 | 33 | 34 | 35 | 36 |




**Zoom to full extent to view Section, Township, Range.**

**There are no links to the maps from this index.**
**Please use the Web Soil Survey**
**http://websoilsurvey.nrcs.usda.gov/app/**
**to access current maps.**

## INDEX TO MAP SHEETS

**FLATHEAD COUNTY AREA AND PART OF LINCOLN COUNTY**
**MONTANA**

1 0 1 2 3
MILES

1 0 1 2 3 4 5 6
KILOMETERS

**SCALE = 1:135000**

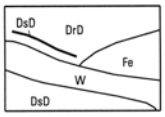
21F Combest gravelly ashy silt loam, 35 to 60 percent slopes
22E Winkler gravelly sandy loam, cool, 15 to 35 percent slopes
22F Winkler gravelly sandy loam, cool, 35 to 60 percent slopes
30E Tevis gravelly loam, 15 to 35 percent slopes
30F Tevis gravelly loam, 35 to 60 percent slopes
31E Tevis gravelly loam, dry, 15 to 35 percent slopes
32E Mitten gravelly ashy silt loam, 15 to 35 percent slopes
32F Mitten gravelly ashy silt loam, 35 to 60 percent slopes
33E Mitten gravelly ashy silt loam, dry, 15 to 35 percent slopes
33F Mitten gravelly ashy silt loam, dry, 35 to 60 percent slopes
34E Winfall gravelly loam, 8 to 30 percent slopes
35D Courville-Winfall complex, 4 to 15 percent slopes
35E Courville-Pleasantvalley complex, 8 to 30 percent slopes
35F Courville-Stevie-Winfall complex, 30 to 50 percent slopes
39D Courville-Rumblecreek complex, 4 to 15 percent slopes
40D Rumblecreek-Courville complex, dry, 4 to 15 percent slopes
40E Rumblecreek-Courville complex, dry, 15 to 30 percent slopes
41F Courville, dry-Rumblecreek, dry-Lozeau, deep complex, 30 to 60 percent slopes
44D Mitten gravelly ashy silt loam, dry, 8 to 15 percent slopes
45D Waldbillig gravelly ashy silt loam, 4 to 15 percent slopes
45E Waldbillig gravelly ashy silt loam, 15 to 30 percent slopes
45F Waldbillig gravelly ashy silt loam, 30 to 60 percent slopes
47D Holloway gravelly ashy silt loam, 4 to 15 percent slopes
47E Holloway gravelly ashy silt loam, 15 to 30 percent slopes
47F Holloway gravelly ashy silt loam, 30 to 60 percent slopes
50B Bigarm gravelly loam, 2 to 8 percent slopes
50D Bigarm gravelly loam, 8 to 15 percent slopes
50E Bigarm gravelly loam, 15 to 30 percent slopes
52D Bigarm gravelly loam, cool, 4 to 15 percent slopes
52E Bigarm gravelly loam, cool, 15 to 30 percent slopes
54F Finleypoint gravelly loam, 30 to 60 percent slopes
56 Finleypoint-Wildgen gravelly loams, 30 to 60 percent slopes
56B Bowlake-Minesinger gravelly loams, 2 to 8 percent slopes
57D Minesinger gravelly loam, 4 to 15 percent slopes
59D Minesinger gravelly loam, cool, 4 to 15 percent slopes, stony
61E McMannamy gravelly silt loam, 8 to 30 percent slopes
61F McMannamy gravelly silt loam, 30 to 50 percent slopes
64E Finleypoint gravelly loam, moist, 15 to 30 percent slopes
66D Battlebutte gravelly loam, 4 to 15 percent slopes
66F Battlebutte gravelly loam, 30 to 60 percent slopes
71E Kingspoint gravelly silt loam, 15 to 30 percent slopes
71F Kingspoint gravelly silt loam, 30 to 50 percent slopes
72A Blacklake mucky peat, 0 to 1 percent slopes
74C Blackcreek-McGregor-Tallcreek complex, 0 to 8 percent slopes
75B Tallcreek ashy silt loam, 0 to 4 percent slopes
80F Sharrott-Rock outcrop-Winkler complex, 15 to 60 percent slopes
81D Foyslake gravelly silt loam, 4 to 15 percent slopes
81E Foyslake gravelly silt loam, 15 to 30 percent slopes
81F Foyslake gravelly silt loam, 30 to 50 percent slopes
83E Ashleylake cobbly ashy silt loam, 8 to 30 percent slopes
83F Ashleylake-Rock outcrop complex, 30 to 50 percent slopes
84E Lozeau gravelly loam, 8 to 30 percent slopes
84F Lozeau gravelly loam, 30 to 50 percent slopes
85C Kila ashy silt loam, 0 to 8 percent slopes
86B Idahocreek silt loam, 0 to 4 percent slopes
87E Pashua gravelly loam, 8 to 30 percent slopes
88C Lesier, dry-Glaciercreek complex, 2 to 8 percent slopes
90E Wimper gravelly silt loam, 15 to 30 percent slopes
91B Biglake gravelly loam, 0 to 8 percent slopes
92F Bata gravelly ashy silt loam, 15 to 50 percent slopes
95D Wimper cobbly silt loam, 4 to 15 percent slopes
99A McLangor-Meadowpeak complex, 0 to 2 percent slopes
122E Winkler, cool-Rock outcrop-Sharrott, cool complex, 8 to 40 percent slopes
138E Winfall-Courville complex, dry, 8 to 30 percent slopes
150E Bigarm-Hogsby-Rock outcrop complex, 8 to 30 percent slopes
150F Bigarm-Hogsby-Rock outcrop complex, 30 to 60 percent slopes
166E Battlebutte-Bigdraw-Rock outcrop, welded tuff complex, 15 to 30 percent slopes
166F Battlebutte-Rock outcrop, welded tuff complex, 30 to 60 percent slopes
168D Bigdraw-Battlebutte gravelly loams, 4 to 15 percent slopes
201E Winkler-Combest complex, 8 to 35 percent slopes
201F Winkler-Combest complex, 35 to 60 percent slopes
211G Combest-Sharrott-Rock outcrop complex, 40 to 85 percent slopes
221F Courville-Rockhill-Rock outcrop complex, 30 to 50 percent slopes
222C Pleasantvalley-Winfall, dry complex, 2 to 8 percent slopes
222E Pleasantvalley-Winfall, dry complex, 8 to 30 percent slopes
223E Pleasantvalley-Winfall, dry-Rock outcrop complex, 8 to 30 percent slopes
223F Pleasantvalley-Winfall, dry-Rock outcrop complex, 30 to 50 percent slopes
224C Pleasantvalley-Finleypoint-Lynchlake, dry complex, 2 to 8 percent slopes
224E Pleasantvalley-Lynchlake, dry-Finleypoint complex, 8 to 30 percent slopes
225F Pleasantvalley-Courville-Glaciercreek complex, 30 to 50 percent slopes
366F Battlebutte-Bigdraw gravelly loams, moist, 30 to 60 percent slopes
491C Wimper-Finleypoint-Haskillpass complex, 2 to 8 percent slopes
491E Wimper-Finleypoint-Haskillpass complex, 8 to 30 percent slopes
512D Perma-Quast-Totelake complex, 4 to 15 percent slopes
541E Finleypoint-Haskillpass-Wimper complex, 8 to 30 percent slopes
542F Finleypoint-Haskillpass-Rock outcrop complex, 15 to 50 percent slopes
543D Finleypoint-Wimper complex, 4 to 15 percent slopes
633D Rockhill-Rock outcrop-Pleasantvalley complex, 4 to 15 percent slopes
633F Rockhill-Rock outcrop-Pleasantvalley complex, 15 to 50 percent slopes
634F Rockhill-Rock outcrop-Courville complex, 15 to 50 percent slopes
671E Glaciercreek-Pleasantvalley complex, 8 to 30 percent slopes
681C Tamarack-Crystalex-Glaciercreek complex, dry, 2 to 8 percent slopes
701D Half Moon, cool-Lynchlake complex, 4 to 15 percent slopes
702E Half Moon, cool-Half Moon complex, 8 to 30 percent slopes
710E Kingspoint-McMannamy complex, 8 to 30 percent slopes
711F Kingspoint-Rock outcrop-Sharrott complex, 15 to 50 percent slopes
712E Kingspoint-Rock outcrop complex, 8 to 30 percent slopes
732A Meadowpeak-Blacklake-McGregor complex, 0 to 2 percent slopes
741C Blackcreek silt loam, 0 to 8 percent slopes
761F Castner-Wimper-Rock outcrop complex, 15 to 50 percent slopes
807A McLangor-Barzee mucky peats, 0 to 2 percent slopes
808A Barzee mucky peat, 0 to 1 percent slopes
811F Foyslake-Rock outcrop complex, 20 to 50 percent slopes
812C Foyslake-Glaciercreek complex, 2 to 8 percent slopes
831D Ashleylake-Foyslake-Kila complex, 0 to 15 percent slopes
835G Ashleylake-Rock outcrop-Rockhill complex, 40 to 70 percent slopes
872E Pashua-Pashua, deep complex, 8 to 30 percent slopes
872F Pashua-Battlebutte, moist-Rock outcrop, welded tuff complex, 30 to 60 perce
881D Lesier, dry-Foyslake-Glaciercreek complex, 4 to 15 percent slopes
882C Lesier, dry-Half Moon, cool complex, 2 to 8 percent slopes
901E Wimper-Castner complex, 8 to 30 percent slopes
902F Wimper-Rock outcrop-Castner complex 15 to 50 percent slopes
931G Repp-Kingspoint-Rock outcrop complex, 40 to 80 percent slopes
941C Trumancreek-Foyslake-Blackcreek complex, 0 to 12 percent slopes
1044D Eaglewing gravelly silt loam, 8 to 15 percent slopes, lake effect
1071E Kingspoint gravelly silt loam, 15 to 30 percent slopes, lake effect
1081E Foyslake gravelly silt loam, 15 to 30 percent slopes, lake effect
1710E Kingspoint-McMannamy complex, 8 to 30 percent slopes, lake effect
1712E Kingspoint-Rock outcrop complex, 8 to 30 percent slopes, lake effect
W Water

Flathead County Area and Part of Lincoln County, Montana

# CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

## SOIL SURVEY FEATURES

SOIL DELINEATIONS AND SYMBOLS




## CULTURAL FEATURES

BOUNDARIES

- National, state, or providence
- County
- Reservation (national or state forest or park)
- Limit of soil survey (label)
- Map sheet neatline
- Quadrangle matchline (shown in white)
- Public land survey system section boundary (shown in white)

ROAD EMBLEMS & DESIGNATIONS

- Interstate
- Federal
- State